Moonlight and Wheeler Fires Recovery & Restoration Project, Mt. Hough Ranger District, Plumas NF

Biological Assessment/Biological Evaluation

Prepared by:

_____ Date: June 10, 2009

Chris Collins
Wildlife Biologist, Mt. Hough Ranger District

Reviewed by:

_____ Date: June 10, 2009

Gary W. Rotta
District Wildlife Biologist, Mt. Hough Ranger District

TABLE OF CONTENTS

INTRODUCTION

The Antelope Complex fire (22,288 National Forest acres) started July 5, 2007 as a result of several lightning strikes and burned approximately 22,300 acres of National Forest (NF) lands on both Mt. Hough and Beckwourth Ranger Districts . Nine wildland fires were ignited and the Wheeler fire became the largest fire within the Antelope Complex.

The Moonlight fire began on September 3, 2007, burned approximately 46,000 NF acres (including 654 acres on the Lassen NF), and was contained by September 15, 2007.

Over 41,295 NF acres of forest vegetation was burned at high severity and 6,531acres burned at moderate severity. Consequently, 47,826 acres of public land are now in a deforested condition characterized by relatively large areas of standing dead trees. Approximately 20,882 acres of forest survived the fire (either experienced low severity burn or non-burned patches).

The USDA Forest Service, Plumas National Forest, Mt. Hough Ranger District, proposes to harvest, utilizing ground-based, helicopter, and skyline logging systems, dead merchantable trees on approximately 14,755 acres. In addition, reforestation treatments would occur in high and moderate vegetation burn severity areas for post fire restoration (approximately 16,006 acres). The project, called the Moonlight and Wheeler Fires Recovery and Restoration Project (referred hereafter as the Moon-Wheeler Project), would start in the summer 2009. All activities proposed would be completed within approximately two to three years. The project area is located southwest, west, and northwest of Antelope Lake and only within the Mt. Hough Ranger District.

The purpose of this Biological Assessment/Biological Evaluation (BA/BE) is to determine whether the proposed action of the Moonlight and Wheeler Fire Recovery and Restoration Project, would result in a trend toward listing or loss of viability for sensitive species, and to document effects on threatened, or endangered species and/or their critical habitat as part of determining whether formal consultation is needed. This BA is prepared in accordance with legal requirements set forth under Section 7 of the Endangered Species Act [19 U.S.C. 1536 (c), 50 CFR 402] and standards established in Forest Service Manual direction (FSM 2672.42).

Five categories of species are considered in this BA/BE; threatened, endangered, proposed, candidate and Forest Service sensitive species. Species federally listed as endangered by the Department of the Interior Fish and Wildlife Service (USFWS) are species currently in danger of extinction throughout all or a significant portion of their range. Species listed as threatened are likely to become endangered within the foreseeable future throughout all or a significant portion of their range. A proposed species is any species that is proposed in the Federal Register to be listed as a threatened or endangered species under the ESA (50 CFR 402.03). A candidate species is a species for which the USFWS has on file enough information to warrant or propose listing as endangered or threatened. Sensitive species are designated by the Regional Forester and are species that

have known or suspected viability problems due to (1) significant current or predicted downward trends in population numbers or density, and/or (2) significant current or predicted downward trends in habitat capability that would reduce a species existing distribution. The Forest Service considers the long-term conservation needs of sensitive species in order to avoid future population declines and the need for federal listing.

This document consists of both a Biological Assessment for federally listed wildlife species based on potential occurrence on the Plumas National Forest ("Federal Endangered and Threatened Species that may be affected by Projects in the Plumas National Forest" updated January 29, 2009 (USFWS database), and a Biological Evaluation for Region 5 Sensitive Species (updated October 15, 2007). Table 1 contains a list of Threatened, Endangered and Sensitive (TES) species addressed in this BA/BE. No critical habitat as designated by the Fish and Wildlife service is present within or near the project area (Federal Register, Vol. 71, No. 71, April 13, 2006 Final Rule).

Table 1. Threatened, Endangered, Proposed* and Sensitive Animal Species that Potentially Occur on the Plumas National Forest

Species	**Category**
INVERTEBRATES	
Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*)	Threatened
FISH	
Hardhead minnow (*Mylopharodon conocephalus*)	Sensitive
AMPHIBIANS	
California red-legged frog (*Rana aurora draytonii*)	Threatened
Foothill yellow-legged frog (*Rana boylii*)	Sensitive
Mountain yellow-legged frog (*Rana muscosa*)**	Sensitive
Northern leopard frog (*Rana pipiens*)	Sensitive
REPTILES	
Northwestern pond turtle (*Clemmys marmorata marmorata*)	Sensitive
BIRDS	
Bald eagle (*Haliaeetus leucocephalus)*	Sensitive
Northern goshawk (*Accipiter gentilis*)	Sensitive
California spotted owl (*Strix occidentalis occidentalis*)	Sensitive
Great gray owl (*Strix nebulosa*)	Sensitive
Willow flycatcher (*Empidonax trailii brewsteri*)	Sensitive
Greater sandhill crane (*Grus canadensis tabida*)	Sensitive
Swainson's hawk (*Buteo swainsoni*)	Sensitive

MAMMALS	
Sierra Nevada red fox (*Vulpes vulpes necator*)	Sensitive
American marten (*Martes americana*)	Sensitive
Pacific fisher (*Martes pennanti pacifica*)***	Sensitive
California wolverine (*Gulo gulo luteus*)	Sensitive
Pallid bat (*Antrozous pallidus*)	Sensitive
Townsend's big-eared bat (*Corynorhinus townsendii*)	Sensitive
Western red bat (*Lasiurus blossevillii*)	Sensitive

*No Federally Proposed species identified by the USFWS (January 29, 2009).
**The Sierra Nevada population of the mountain yellow-legged frog designated as a candidate species by USFWS (Federal Register January 16, 2003 Volume 68, #11), but listing under the Endangered Species Act is precluded by the need to take other listing actions of a higher priority (amended 12-month finding, Federal Register June 25, 2007, Vol. 72, No 121).
***The West Coast population of the fisher designated as a candidate species by USFWS (Federal Register April 8, 2004 Volume 69, #68), but listing under the Endangered species Act is precluded by other, higher priority listing actions.

Several T&E species identified in the list of T&E species provided by the "Federal Endangered and Threatened Species that may be affected by Projects in the Plumas National Forest", updated January 29, 2009, accessed via USFWS county list web page, have been eliminated from further analysis, based on past analysis and concurrence from the US Fish & Wildlife Service (HFQLG BA/BE Rotta 1999, USFWS letter 1-1-99-I-1804 dated August 17, 1999) or due to lack of species distribution and/or lack of designated critical habitat. These species are listed below:

- Winter Run Chinook Salmon (*Oncorhynchus tshawaytsha*)
- Central Valley steelhead (*Oncorhynchus mykiss*)
- Central Valley spring-run Chinook salmon (*Oncorhynchus tshawaytsha*)
- Delta Smelt (*Hypomesus transpacificus*)
- Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*)
- Carson wandering skipper (*Pseudocopaeodes eunus obscurus*)
- Critical Habitat for vernal pool invertebrates (Butte County)
- Critical habitat for California Red-legged frog

CONSULTATION TO DATE

A list of T&E species was provided by the "Federal Endangered and Threatened Species that may be affected by Projects in the Plumas National Forest", updated January 29, 2009 accessed via USFWS county list web page (http//sacramento.fws.gov/es/spp_lists/NFActionPage.cfm).

CURRENT MANAGEMENT DIRECTION

Current management direction for threatened, endangered, proposed and sensitive species on the Plumas National Forest can be found in the following documents:

- Code of Federal Regulations (23, 36, 50 CFR)
- Forest Service Manual and Handbooks (FSM/H 1200, 1500, 1700, 2600)
- Endangered Species Act (ESA; 1976)
- National Environmental Policy Act (NEPA; 1969)
- National Forest Management Act (NFMA; 1976)
- Plumas National Forest Land and Resource Management Plan (PNF LRMP; 1988)
- Regional Forester (Region 5) policy and management direction
- Regional Forester (Region 5) Sensitive Animal Species by Forest (updated June 10, 1998), as appended 15 October, 2007
- USFWS Species List (updates through January 31, 2008)
- Herger-Feinstein Quincy Library Group Forest Recovery Act and its implementing Environmental Impact Statement (August 1999)
- Sierra Nevada Forest Plan Amendment, Final Supplemental Environmental Impact Statement, Record of Decision, January 2004
- HFQLG/SNFPA Implementation Consistency Crosswalk Update 11/08/2007
- Sierra Nevada Forests Management Indicator Species Amendment FEIS, December 2007.

The National Forest Management Act (NFMA) includes direction to preserve and enhance the diversity of plant and animal communities, including endemic and desirable naturalized plant and animal species, so that the diversity is at least as great as that which would be expected in a natural forest and the diversity of tree species is similar to that existing in the planning area (36 CFR 219.26 and 219.27). One of the key ways this direction is implemented is through the NFMA regulations concerning species viability, (36 CFR 219.19). The viability requirement, under NFMA, is not limited to species identified by the Regional Forester as sensitive. The consultation process, including determinations made in the BA/BE, any incidental take statements, and/or mandatory terms & conditions, as well as any conservation recommendations are designed to address viability of threatened, endangered and Forest Service sensitive (TES) species.

Forest Service direction for TES species incorporated in this BA/BE can be found in the Forest Service Manual (FSM 2670.31, FSM 2670.32). Information regarding threatened, endangered, proposed and sensitive animals is also obtained through the cooperation of the USFWS and the California Department of Fish and Game (CDFG).

The Plumas National Forest Land and Resource Management Plan (LRMP) provides Forest specific information on how TES species will be managed. These include forest wide goals and policies for Wildlife, Fish and Sensitive Plants (p. 4-4) and Riparian Areas (p. 4-7), Wildlife objectives (p. 4-14, 4-15, and 4-19), forest wide direction and standards and guidelines for Wildlife, Fish and Sensitive Plants (p. 4-29 through 4-32). Management Area specific and species-specific direction and prescriptions will be included in the species discussions below. Direction is also found under other areas (e.g., timber management) that directly or indirectly affect animal species and/or their habitats. This direction is incorporated by reference. The PNF-LRMP provides management guidelines that incorporate Regional direction for each species. Current TES and wildlife

direction can be found in the PNF-LRMP, as amended by the HFQLGFRA EIS, as amended by SNFPA FSEIS ROD (2004), for Wildlife, Fish, Riparian Ecosystems and riparian-dependent wildlife species.

As per the May 10, 2004 letter (and attachments) from the three Forest Supervisors within the HFQLG pilot project area, the 2004 SNFPA ROD replaced the 2001 SNFPA ROD in its entirety and the 2001 ROD, or the 2001 Appendix A should not be used. Attachments to this May 10 letter provides consistent guidance for applying 2004 SNFPA ROD and FSEIS and the HFQLG FEIS.

More specific direction concerning project analysis and determinations for the California spotted owl are found in the June 3, 2004 letter to District Rangers entitled "Clarification on SNFPA California Spotted Owl Strategy and HFQLGFRA Implementation" from the Forest Supervisors of the Lassen, Plumas, and Tahoe National Forests and the July 23, 2004 draft letter entitled "How Project BA/BEs relate to Forest Plan Level Analysis and Determinations of Effect" from the Region 5 Office.

Project level effects analysis on habitat for Management Indicator Species (MIS) is conducted using guidelines provided by "Sierra Nevada Forests Management Indicator Species Amendment FEIS", December 2007. The only TES species identified as MIS on the Plumas NF in the 2007 FEIS is the California spotted owl.

DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

The Moonlight and Wheeler Fires Recovery and Restoration Project (referred hereafter as the Moon-Wheeler Project) is located on lands administered by the Plumas National Forest approximately 17 miles east of Greenville, California, near Antelope Lake on the Mt. Hough Ranger District, Plumas National Forest. The project area is within Management Areas 28 and 29 as described in the Plumas National Forest Land and Resource Management Plan (LRMP). Management direction for these areas are described in the Plumas LRMP as amended by the Record of Decision for the HFQLGFRA EIS, as amended by the 2004 SNFPA ROD.

Five alternatives are fully analyzed for the Moon-Wheeler Project Environmental Impact Statement. All alternatives are discussed in this BA/BE: the Proposed Action (Alternative A), the No Action Alternative (Alternative B), Alternative C, Alternative D, and Alternative E.

The SNFPA ROD (2004) identifies the need to incorporate ecosystem restoration following catastrophic events (II. Rationale for Decision, Old Forest Ecosystems and Associated Species, Restoration, page 6). This project is specifically focusing on the recovery of the economic value of fire-killed trees (high and moderate vegetation burn severity), roadside hazard timber harvest, and conifer seedling planting (restoration). The action of recovering the economic value of fire-killed trees would contribute to the long-term stability and economic health of rural communities. The action of conifer seedling

planting would contribute to ecosystem restoration, as well as long-term stability and economic health.

The **Proposed Action (Alternative A)** to meet the above objectives:

Harvest fire-killed or roadside hazard trees within the project area. Specifically:

1. Ground-based logging systems would remove trees greater than 14 inches dbh as sawlog product and trees less than 14 inches dbh would be removed as a biomass product, on up to 4,147 acres.
2. Skyline logging systems (872 acres): On 872 acres dead trees greater than 16 inches dbh would be harvested and removed as sawlog product.
3. Helicopter logging systems (5,347 acres): On 5,347 acres harvest and remove dead trees greater than 16 inches dbh.
4. Fell and remove fire-killed and fire-injured trees along 123 miles of National Forest system roads that have been identified as hazard trees (up to 4,389 acres). Harvest activities would occur within 150 feet from the road prism. Trees greater than 10 inches dbh would be removed as sawlog product and trees less than 10 inches dbh would be removed, as a biomass product
5. Felling of non-merchantable trees within skyline and helicopter units (those trees that do not contain a 16-foot log and/or are less than 16 inches dbh) that pose a hazard may occur in order to comply with worker Occupational Safety and Health Administration (OSHA) regulations for logging. Such trees would be directionally felled on the contour, limbed, lopped, and limbs would be scattered.
6. Riparian Habitat Conservation Areas (RHCAs) within units would be harvested.
7. Construction of approximately 19 miles of temporary roads to access the treatment units. Fourteen new helicopter landings would be constructed (about 30 acres). Temporary roads and landings would be decommissioned, mulched or subsoiled after project implementation.
8. Site preparation and planting of native conifer seedlings on up to 16,006 acres Specifically:

    a) Approximately 100 to 200 trees per acre would be planted in clusters. Species to be planted would include ponderosa pine, Jeffrey pine, Douglas-fir, incense cedar, and rust resistant sugar pine.

    b) Site preparation would include manual grubbing and/or scalping of competing vegetation down to mineral soil five feet in diameter around the planting spot.

Snag retention areas would be designated to provide for large snags and large down woody material recruitment to rehabilitate habitat structure within treatment units. Snags would be retained in numbers appropriate for each forest type. In Sierra mixed conifer and ponderosa pine forest types, four of the largest snags per acre would be retained. Snag densities would be averaged over the project area. Green tree and snag retention guidelines would provide for future replacement snags and down woody material over time. Snag retention objectives would be attained by various methods in project design:

a. Snag retention areas, ranging in size from 7 to 26 acres, were designated over approximately ten percent (1,060 acres) of salvage treatment units. Fire-killed tree removal generally would not occur within these snag retention areas. Primary selection criteria for snag retention areas were 1) areas formerly identified as Spotted Owl PACs, 2) along treatment unit boundaries adjacent to non-burned and low severity areas, 3) within RHCAs, and 4) in stands that supported a minimum of 40% canopy cover pre-fire.

b. Dead trees would be retained within RHCAs to meet RMOs for down woody debris recruitment. RHCAs would be incorporated into snag retention areas where appropriate.

c. Outside treatment areas no dead tree removal is planned to occur under this project. These areas would contribute higher snag density clusters in large contiguous blocks to meet total required number of snags per acre across the project area.

d. Within helicopter and skyline units, the proposed action calls for the removal of dead trees 16" dbh and larger. This would result in the retention of smaller dead trees (<15.9" dbh) scattered and clumped across all 7,929 acres of these units.

The **No Action Alternative (Alternative B)** would not implement the above actions to achieve the stated objectives. There would be no removal of fire-killed or hazard trees, no road construction/reconstruction, and no site prep or reforestation.

Alternative C: Ground Based Logging Systems. This alternative is similar to the proposed action (Alternative A) but does not include harvest, access, or reforestation activities within areas designated for skyline or helicopter logging systems. Specifically:

1. In ground-based logging systems, fire-killed trees greater than 14 inches dbh would be removed as sawlog product and trees less than 14 inches dbh would be removed, up to 4,147 acres, as a biomass product.
2. Fell and remove fire-killed and fire-injured trees along 123 miles of National Forest system roads that have been identified as hazard trees (up to 4,389 acres).
3. Riparian Habitat Conservation Areas (RHCAs) within units would be harvested.
4. Construction of approximately 18 miles of temporary roads to access the treatment units. Temporary roads and landings would be decommissioned, mulched or subsoiled after project implementation.
5. Site preparation and planting of native conifer seedlings on up to 9,306 acres
6. Snag retention areas, ranging in size from 7 to 26 acres, were designated over thirteen percent (up to 580 acres) of salvage treatment areas.

Alternative D: This alternative is consistent with the 2001 SNFPA ROD and avoids the Old Forest Emphasis (OFE) land allocation (including California spotted owl Home Range Core Areas (HRCAs) and California spotted owl Protected Activity Centers (PACs). It is similar to Alternative C in that it only proposes treatment using ground based logging systems. Specifically:

1. In ground-based logging systems, fire-killed trees greater than 14 inches dbh would be removed as sawlog product and trees less than 14 inches dbh would be removed, up to 1,267 acres, as a biomass product.
2. Fell and remove fire-killed and fire-injured trees along 123 miles of National Forest system roads that have been identified as hazard trees (up to 4,389 acres).
3. Riparian Habitat Conservation Areas (RHCAs) within units would be harvested.
4. Construction of approximately 3 miles of temporary roads to access the treatment units. Temporary roads and landings would be decommissioned, mulched or subsoiled after project implementation.
5. Site preparation and planting of native conifer seedlings on up to 16,006 acres
6. Snag retention areas, ranging in size from 7 to 26 acres, were designated over ten percent (up to 127 acres) of salvage treatment areas.

Alternative E: Roadside Hazard Treatment and Reforestation. Specifically:

1. Fell and remove fire-killed and fire-injured trees along 123 miles of National Forest system roads that have been identified as hazard trees (up to 4,389 acres).
2. Riparian Habitat Conservation Areas (RHCAs) within units would be harvested.
3. Site preparation and planting of native conifer seedlings on up to 16,006 acres

EXISTING ENVIRONMENT

The treatment units are defined as the areas to be treated with fire-killed or hazard tree removal and reforestation. The **analysis area** is defined as the 87,647 acre area (68,408 acres or 78% is Forest Service lands) where the Moonlight and Antelope Complex fires burned with the exception of 82 acres of spot fires which occurred outside of the main fire perimeters. The analysis area is located in predominately Sierra mixed conifer forest habitat ranging in elevation from 3,800 feet in the North Arm of Indian Valley to 7,500 feet at the top of Eisenheimer Peak The analysis area is largely along the cusp of the Transition and Eastside ecological zones (USDA 1999).

The Moonlight and Wheeler Fire perimeter (87,647 acres) was chosen as the analysis area for the following reasons: 1) Proximity and adjacency of these two fires and similar severity effects has had a major effect on the landscape. 2) The proposed actions would treat and modify burned areas only. Therefore, selection of the total area that burned within both fires for analysis provides a more appropriate context for reasonable determination of effects to habitat (and the species associated with this habitat) proposed for treatment. 3) Relevant cumulative effects, particularly other projects that have or will treat burned habitat resulting from the two fires, are more effectively addressed. 4) The impacts to habitat as a result of the wildfires and the effects from cumulative actions within this burned landscape are not diluted by expanding the analysis area boundary to include larger parcels of unburned habitat outside the wildfire boundary. 5) The aquatic analysis is the same as the hydrologic analysis area and includes the subwatershed affected by the proposed action.

For the purpose of the wildlife analysis, the temporal bounds include a 30-year horizon for future effects because modeling indicates that, within timeframe, the treated stands would approach stocking levels corresponding with forest development (i.e. young forested stands could develop within this timeframe). General trends and trajectories of stand development that extends beyond 30 years are discussed in this analysis to document when habitat conditions suitable for specific species will likely be reached.

Table 2 describes all TES species that potentially could occur within the vicinity of the project area. Species that have been located within the project area, or suitable habitat is present in the project area and the project area is within the range of the species, may be analyzed further for potential impacts from the proposed project.

Table 2. Potential Occurrence of Threatened, Endangered, Proposed or USFS Region 5 Sensitive Species and their Habitats in the Vicinity of the Moon-Wheeler Project.

Species Name	Elev Range (feet)	Habitat	Potential Threats	Status on PNF*	Suitable Habitat w/in Project Area	Detection w/in Project Area	Analysis synopsis
Invertebrates							
Desmoceras californicus dimorphus VALLEY ELDERBERRY LONGHORN BEETLE Threatened	0-2,500	Any chaparral habitat that contains the elderberry plant. Two critical habitat areas identified. Not on Forest Service lands	Removal or destruction/disturbance of the elderberry plant	No detections within PNF	No	No	No suitable habitat within project area; outside range of species.
Amphibians							
Rana aurora draytonii CALIFORNIA RED-LEGGED FROG Threatened	0-4,500	Cool-water ponds and stream pools with emergent vegetation & still or slow-moving water.	Destruction, degradation, & fragmentation of riparian habitat. Exotic predators & competitors	About 12 site detections in Butte County within PNF boundary	No	No	Project Area outside current known range of species. Recent surveys have not located any individuals.
Rana boylii FOOTHILL YELLOW-LEGGED FROG Forest Service R5 Sensitive Federal Species of Concern	< 6400	Sierran foothills. Breed in shallow, slow flowing water with at least some pebble and cobble substrate. Found in riffles and pools with some shading (>20%)in riparian habitats, and moderately vegetated backwaters, isolated pools, and slow moving rivers with mud substrate. Rarely found far from permanent water.	Altered stream flow regimes and introduced exotic predators (fish & bullfrogs), grazing, mining, recreation, chitrid fungus	>50 site detections on PNF	Yes	No	No detections within or adjacent to Project Area
Rana muscosa MOUNTAIN YELLOW-LEGGED FROG Forest Service R5 Sensitive Federal Candidate	4500 - 12000	Plumas to Tulare Co. Found in ponds, tarns, lakes and streams with sufficient depth and adequate refuge for over wintering.	Fish stocking, UV radiation, deposition of airborne pollutants, recreation., grazing, chitrid fungus	>50 site detections on PNF	Yes	Yes	Analyzed in text. Detections in analysis area.

Species Name	Elev Range (feet)	Habitat	Potential Threats	Status on PNF*	Suitable Habitat w/in Project Area	Detection w/in Project Area	Analysis synopsis
Rana pipiens NORTHERN LEOPARD FROG Forest Service R5 Sensitive	Sea level to 7000	Semi-permanent to permanent aquatic habitats with dense emergent or submergent vegetation. Scattered introduced populations in southern and central California. Native to Lassen and Modoc Cos.	Livestock grazing, exotic introduced predators	No detections on PNF	No	No	Isolated, restricted populations. Nearest population more than 30 miles north of analysis area.
Fish							
Mylopharodon conocephalus HARDHEAD Forest Service R5 Sensitive	< 6000	Widely distributed in undisturbed reaches of low to mid elev streams from the Kern River in the south to the Pit River in the north.	Population isolation, hydro-electric power, predation by smallmouth bass	Known distribution is 135 miles; suspected in 80 additional miles.	No	No.	Suspected to occur in Indian Creek 6 miles downstream of analysis area.
Reptiles							
Clemmys marmorata marmorata NORTHWESTERN POND TURTLE Forest Service R5 Sensitive Federal Species of Concern	< 4700	Aquatic habitat in spring and summer. Adjacent upland habitat fall and winter. In rivers, needs slow flowing areas with deep underwater refugia and emergent basking sites. Migration, hibernation, and nesting occur on land up to 330 feet from riparian area.	Non-native fauna, non-native turtles through competition and disease, bullfrogs and predatory fish, vehicles, timber harvest, mining, fire, grazing, water alteration and diversion, fishing.	>50 detections from about 25 sites across the PNF (Butte & Plumas County)	Yes	No	No detections within project area.
Birds							
Haliaeetus leucocephalus BALD EAGLE Forest Service R5 Sensitive	Sea level - 7000	Throughout northern and central CA. Wintering and nesting habitat associated with lakes, reservoirs, rivers or large streams. Needs large, old trees near water for nesting.	Removal of nesting habitat, high recreation use on lakes, DDT in eggshells, disturbance near nest sites.	23 nesting territories on PNF	Yes	Yes	Two nest territories at Antelope Lake. One territory in project area. No territory, no nesting or foraging sites within treatment units. Analyzed in text.
Accipter gentiles NORTHERN GOSHAWK Forest Service R5 Sensitive Federal Species of Concern	2500 - 10000	Throughout northern CA and Sierra Nevada; Dense mature conifer and deciduous forests interspersed with meadows, other openings and riparian areas. Found in Mixed Conifer to Lodgepole Pine	Logging, catastrophic fire	144 Goshawk PACs containing 28,800 acres of sutiable habitat (2006)	Yes	Yes	Analyzed in text. Detections in project area prior to fire.

Species Name	Elev Range (feet)	Habitat	Potential Threats	Status on PNF*	Suitable Habitat w/in Project Area	Detection w/in Project Area	Analysis synopsis
Empidonax traillii brewsteri WILLOW FLYCATCHER Forest Service R5 Sensitive Federal Species of Concern	2000 – 8000	Western Sierra Nevada's Found in, willow-dominated riparian areas, including moist meadows with perennial streams and smaller spring-fed or boggy areas.	Grazing, adjacent land use, brown-headed cowbird parasitism, reduction in nesting habitat	139 detections at 25 sites across the Forest since 1993	Yes	Yes	Detections in project area. No detections in treatment units. Habitat not impacted by action alternatives.
Strix occidentalis occidentalis CALIFORNIA SPOTTED OWL Forest Service R5 Sensitive Federal Species of Concern PNF MIS	1000 - 7440	Sierra Nevada province in CA. Need at least 40% canopy closure and an average d.b.h. of 30 inches.	Timber harvest, fire suppression, excessive build-up of fuels, decline in snag density.	296 PACs Approximate number in 2005	Yes	Yes	Analyzed in text. Detections in project area and treatment units prior to fire.
Strix nebulosa GREAT GRAY OWL Forest Service R5 Sensitive	2500-9000 –	Western Sierra Nevada's with 60% in Mariposa and Tuolumne Co. Breeds in Yosemite NP area. Found in montane meadows surrounded by dense forest of medium to large mixed conifer and red fir.	Grazing, logging of suitable nest trees and buffer.	Suspected population of 1 to 3 pair	Yes	No	Stringer meadow/forest ecotone habitat in project area. Species not present in project area
Buteo swainsonii SWAINSON'S HAWK Forest Service R5 Sensitive	-	Uncommon breeding resident and migrant in the Central Valley, Klamath Basin, Northeastern Plateau, Lassen Co., and Mojave Desert; found in open desert, grassland, or cropland containing scattered, large trees or small groves.	Loss of nesting habitat to agriculture and grazing	No detections on PNF	No	No	Project is outside primary range of species on Northeastern Plateau and Central Valley. No suitable habitat within or near project area.
Grus canadensis labida GREATER SANDHILL CRANE Forest Service R5 Sensitive	-	Breeds in Siskiyou, Modoc, Lassen, Sierra Valley, Plumas and Sierra counties and winters primarily in the Central Valley; found in wet meadow, shallow lacustrine, and fresh emergent wetland habitats	Loss of extensive wetland habitat required for breeding; human disturbance; grazing	<20 nesting pairs across private/NF land in Plumas County	No	No	No Suitable habitat within project area. Migratory flights sighted in area.
Mammals							
Antrozous pallidus PALLID BAT Forest Service R5 Sensitive	< 6000	Uses a variety of habitats. Depends on oak woodlands for foraging. Roosts in mines, snags, and in crevices in oaks	Roost disturbance, loss of oak habitat, pesticide use and grazing, loss of suitable nesting & roosting snags.	>200 detections of individuals @ approx. 50 sites across the PNF	Yes	No	Suitable habitat in project area. Analyzed in text. Possible in area.
Corynorhinus townsendii TOWNSEND'S BIG-EARED BAT Forest Service R5 Sensitive	< 10000	Found throughout the Sierra Nevada. Inhabits isolated areas with low human disturbance.	Human disturbance in caves, mines, historical buildings, mining,	<30 detections of individuals @ approx 15 sites on PNF	Yes	No	Low risk of presence in area; habitat not impacted by action.

Species Name	Elev Range (feet)	Habitat	Potential Threats	Status on PNF*	Suitable Habitat w/in Project Area	Detection w/in Project Area	Analysis synopsis
Lasiurus blossevillii WESTERN RED BAT Forest Service R5 Sensitive	< 3000	Dependent on edge habitats adjacent to riparian areas. Roosts in foliage.	Removal of riparian habitat, pesticides, water impoundments, fire. loss of roosting trees, such as cottonwood/aspen.	<50 detections of individuals @ approx 20 sites on PNF	Yes	No	Suitable habitat found within project area. Possible in area. Analyzed in text.
Gulo gulo luteus CALIFORNIA WOLVERINE Forest Service R5 Sensitive Federal Species of Concern	6400 - 10800	Use a variety of habitats. Dens include snow-covered roots, standing or down logs with large cavities, holes under coarse woody debris, old beaver lodges, bear dens or rocky areas.	Recreation, vehicles, decrease in wild areas, , mining, decrease in deer population	No detections on PNF.	No	No	No confirmed historical sightings on forest. Photo verification on TNF 2/28/08.
Martes pennanti pacifica PACIFIC FISHER Forest Service R5 Sensitive Federal Species of Concern	4900 - 7900	Forests with high canopy closure and structural elements of late successional old-growth forest. Closely associated with water or riparian habitats (328 ft). Rest sites include large standing conifers or hardwoods. Dens occur in cavities of standing large diameter conifers or hardwoods (snags or live trees).	Forest fragmentation, logging, fire, climate, land use patterns, metapopulation dynamics	No verified detections of this species on the PNF in last 30+ years; PNF within 250 mile gap in species distribution.	Yes	No	No known records in project area.
Martes Americana AMERICAN MARTEN Forest Service R5 Sensitive Federal Species of Concern	>6000	Found in mesic, late successional coniferous forests. Dens are in trees, snags, downed logs and rocks in structurally complex old forests.	Forest fragmentation, logging, fire, climate, land use patterns, metapopulation dynamics	40+ detections; most all isolated to Lakes Basin on PNF	Yes	No	No known records in project area. Analyzed in text. Possible in project area.
Vulpes vulpes necator SIERRA NEVADA RED FOX Forest Service R5 Sensitive Federal Species of Concern	5000 - 12000	Red fir and Lodgepole pine in subalpine and alpine fell-fields of the Sierra Nevada. Similar to marten and fisher. Dens seem to be in rock/talus slides or earthen excavations/holes.	Conversion of late serial stage forest to early serial, which favors competitors such as coyote and non-native red fox.	No detections on PNF	Yes	No	No historical sightings on MTH RD.

Primary Sources: California's Wildlife, Volumes I, II and III. CWHR. Zeiner et al. 1988, 1990a, 1990b.
Jennings and Hayes 1994 BA/BE Reference Document, HFQLGFRA FEIS 2000, USDA 1993

*Status on PNF taken from Forest GIS coverages, Forest databases, PNF MIS Report (Nov 2006), and individual project survey reports. Systematic surveys for a number of species have been conducted in the past, both at a Forest level as well as at the project level that generate distribution and abundance data; data also comes from incidental sightings.

Forest-wide vegetation typing into California Wildlife Habitat Relationships (CWHR) habitat classifications was done for the Plumas-Lassen Administrative Study in 2002 (Vestra, 2002). This vegetation layer was updated after various fires (including the 2001 Stream fire within the project area) and in 2008 updated again to reflect the Moonlight and Antelope Complex fires. Existing updated Vestra maps, vegetation severity maps and

2007 infra-red aerial photos were used to generate the post fire vegetation map used for this analysis (Veg Mgt Solutions).

The updated layer produced by this typing is used in this analysis. All vegetation information is displayed using the California Wildlife Habitat Relationships (CWHR) vegetation codes and serves as the baseline acres for analysis. Table 3 summarizes the CWHR types within the project area. Other sources of information used in the assessment of effects were aerial photos, burn severity maps generated from satellite imagery, data generated from common stand exam plots and field reconnaissance.

Table 3: Summary of CWHR acres within the Analysis Area*; from VESTRA 2002, updated with Fire Severity maps and 2007 aerial photography (public lands only).

CWHR Type*	Pre-fire	Post Fire (first five years)	CWHR Type	Pre-Fire	Post Fire (first five years)	CWHR Type	Pre-Fire	Post Fire (first five years)
SMC1	23	57	RFR3M	5	0	EPN4P	1961	1861
SMC2S	1400	103	RFR4S	2	33	EPN4M	928	325
SMC2P	45	36	RFR4P	51	102	EPN4D	107	42
SMC2M	0	2	RFR4M	136	41	EPN5S	0	59
SMC2D	138	0	RFR4D	6	0	EPN5P	14	29
SMC3S	264	407	RFR5P	18	0	EPN5M	100	42
SMC3P	120	146	RFR5M	38	0	EPN5D	42	
SMC3M	111	31	PPN1	0	23	JPN5M	0	20
SMC3D	151	4	PPN2S	1052	199	LPN3P	0	1
SMC4S	551	3081	PPN2P	90	7	LPN3M	0	6
SMC4P	3469	6416	PPN2M	0	3	LPN3D	0	11
SMC4M	12529	1674	PPN3S	130	140	LPN4S	2	5
SMC4D	1313	149	PPN3P	542	116	LPN4P	0	19
SMC5S	84	187	PPN3M	571	0	LPN4M	0	11
SMC5P	899	403	PPN4S	199	427	LPN4D	8	
SMC5M	10211	296	PPN4P	575	757	LPN5P	0	3
SMC5D	3171	91	PPN4M	1358	176			
WFR2S	104	19	PPN4D	171	5	AGS	221	810
WFR3S	317	146	PPN5S	25	18	ASP	851	472
WFR3P	75	33	PPN5P	163	24	MCP	1338	39023
WFR3M	103	1	PPN5M	77	0	MHC	5	11
WFR3D	53	0	EPN1	33		MHW	1733	1214
WFR4S	799	1204	EPN2S	33	22	MRI	438	532
WFR4P	1967	3785	EPN2P	0	5	PGS	7	339
WFR4M	8775	938	EPN2M	26		SGB	188	132
WFR4D	1325	90	EPN3S	0	21	WTM	690	171
WFR5S	39	4	EPN3P	397	176	ROCK	192	242
WFR5M	4827	147	EPN3M	71		BAR	0	98

WFR5D	537	6	EPN3D	0	5			
RFR3P	50	23	EPN4S	284	1094			
						Total	68408	68408

*1 = seedling tree <1" dbh, 2 = Sapling tree 1-6" dbh, 3 = Pole tree 6-11" dbh, 4=small 11-24"dbh, 5=medium/large >24"dbh. D= Dense Canopy Cover > 60%, M= Moderate Canopy 40-59%, SMC=Sierra Mixed Conifer, PPN = Ponderosa Pine, WFR = White Fir, EPN = Eastside Pine, RFR = Red Fir, MHC = Montane Hardwood Conifer, MHW = Montane HardwoodPGS = Perennial Grassland, MCP = Montane Chaparral, MRI = Montane Riparian, WAT = Water, WTM = Wet Meadow.

Table 3 indicates the following: 1) as a result of the wildfire, within the analysis area, 97 percent of the late seral closed canopy habitat (CWHR 5M, 5D) was consumed by wildfire (19,003 acres reduced to 602 acres); 2) a large majority of CWHR 4 and 5 stands were converted to non-forested vegetation types that are expected to be dominated by brush; 3) 519 acres of wet meadow were either converted to dry meadow (expressed as PGS) or some other CWHR type as a result of more precise mapping of this particular type; 4) losses in aspen habitat actually resulted from more precise mapping of this particular type; no aspen loss is anticipated as a result of wildfire or project actions.

Species Accounts and Determination of Effects

Threatened and Endangered Species

A list of T&E species was provided by the "Federal Endangered and Threatened Species that may be affected by Projects in the Plumas National Forest" (PNF), updated January 29, 2009, accessed via USFWS county list web page (http//sacramento.fws.gov/es/spp_lists/NFActionPage.cfm). There are no Federally Proposed species identified by the USFWS as occurring on the PNF. Based on this list, and information presented in Tables 2 and 3 regarding range of species, presence of species or presence of species suitable habitat within project area, it is determined that the Moon-Wheeler Project would have no affect on the two Federally listed species present on the Plumas National Forest.

Table 4. Federally-Listed Species

Scientific Name	Common Name	Suitable Habitat in area	Observed in Project area (Y/N)	Finding
Desmoceras californicus dimorphus	Valley Elderberry Longhorn Beetle	No	No	No affect
Rana aurora draytonii	California Red-legged Frog	No	No	No affect

The project area is well above the known occupied and the elevational range for the Valley Elderberry Longhorn Beetle and will no longer be discussed.

California Red-legged frog (CRLF)

Critical habitat for this species was designated in 2001 (USFWS 2001) and included the North Fork Feather River Drainage located in Plumas and Butte counties. However the Final Rule (USFWS 2004) on Critical Habitat for this species excluded the entire habitat within Plumas County. Therefore the project area is not located within or immediately upstream of California red-legged frog Critical Habitat.

Habitat for this species consists in general of cool-water ponds and stream pools with emergent vegetation & still or slow-moving water. This species' known elevational range extends from sea level to approximately 1,500 meters or 4,921 feet (Jennings, 1994), or 5,200 feet (USFWS, 2002). Nearly all sightings within the CRLF range have occurred below 1,050 meters or 3,500 feet (Ibid). The proposed project occurs from 3,800 feet in the North Arm of Indian Valley to 7,500 feet. The majority of the analysis area is outside of this species' elevational range. Past surveys conducted on the Plumas National Forest in Plumas County, including Coldstream and Lone Rock Creek (ECORP 2001) and Moonlight Valley and West Branch Lights Creek (NSR 2001), all within the analysis area, have not detected this species. Based on the lack of presence of this species in Plumas County, as well as the elevational range of the analysis area, this project will not affect this species.

Determination: T&E Species
Based on the scope, design, and location of the project, implementation of the proposed project will not affect California red-legged frog, the one federally listed species potentially present in the project vicinity.

Forest Service Region 5 Sensitive Species

A. Species with a Will Not Affect Determination

The implementation of the project will not affect the USFS sensitive species listed in Table 5. A Will Not Affect (WNA) determination was made based on 1) lack of species presence within the area, and/or 2) lack of habitat in the analysis area, and/or 3) no impact to habitat as a result of dead tree removal within high and moderate severity burn areas.

Table 5. USFS Region 5 Sensitive Species – Will Not Affect Determination

Scientific Name	Common Name	Suitable Habitat Present in Project Area	Observed in Project Area (Y/N)	Finding
Mylopharodon conocephalus	Hardhead Minnow	No	No	WNA
Rana boylii	Foothill Yellow-legged Frog	Yes	No	WNA
Rana pipiens	Northern Leopard Frog	No	No	WNA

Clemmys marmorata	Pond Turtle	No	No	WNA
Empidonax traillii	Willow Flycatcher	Yes	No	WNA
Strix nebulosa	Great Gray Owl	Yes	No	WNA
Buteo swainsonii	Swainson's Hawk	No	No	WNA
Grus Canadensis labida	Greater Sandhill Crane	No	No	WNA
Martes pennanti	Pacific Fisher	Yes	No	WNA
Gulo gulo luteus	California Wolverine	No	No	WNA
Vulpes vulpes necator	Sierra Nevada Red Fox	Yes	No	WNA
Corynorhinus townsendii	Townsend's Big-eared Bat	Yes	No	WNA

Suitable **willow flycatcher** habitat within the Moon-Wheeler analysis area has been systematically surveyed over the past 16 years (USFS PNF 1990, USFS PNF 1991, USFS PNF 1993, Lights Creek Allotment 1994, Hungry Creek Allotment 1995, Antelope Border 2000, Wild 2001, Moonlight 2001- all unpublished reports). The only known willow flycatcher location within the analysis area is Little Antelope Creek Meadow at Antelope Lake. A pair was detected in 1982 and again in 2001. In 2005 a singing male with a presumed female nearby was reported (Williams Wildland Consulting, Inc. 2005). Portions of this meadow and the surrounding conifer edge burnt at moderate to low intensity. This occupied habitat area is not within the treatment units for the Moon-Wheeler Project. The portion of road 28N03 that runs near this habitat is subject to hazard tree removal, but this action will not alter any willow flycatcher habitat. No other "occupied" habitat sites occur within the analysis area. Dead tree removal and reforestation would not impact any habitat component required by this species.

Suitable meadow habitat is present for **great gray owl**, but dead tree removal will not impact any meadow habitat or suitable non-burned forested habitat along meadow edges. Protocol great gray owl surveys conducted in 2000 in portions of the analysis area for the Antelope/Border project, or surveys in 2001 and 2003 for the Cold Project and the TU9 planning areas, did not detect the species. No known great gray owls are present in the project

The current distribution of **Pacific fisher** within California suggests that the once continuous distribution is now apparently fragmented into two areas separated by a distance that greatly exceeds reported fisher dispersal ability. Methodologies used to detect fisher in numerous survey efforts have failed to detect this species in an area between Mt. Shasta and Yosemite National Park (Zielinski et al, 1995). These authors strongly suggest that the absence of fisher detections within this large 240-mile area is because they do not occur in the areas surveyed; since 1990 there have generally been no detections or confirmed sightings of fisher within this 240 mile gap of the Sierra Nevada (Note: gap is identified as 240 miles in SNFPA 2001, 260 miles in Fed. Register 2004). The Moon-Wheeler project is located within this "gap". Recent monitoring conducted

from 2002-2006 by the Forest Service for the Sierra Nevada Forest Plan focused on documenting population expansion in the northern Sierras (USDA 2008. Results from 2002-2006, in which 140 sites were surveyed, have not detected fishers in the central, northern or eastern Sierra. Zielinski et al (2005a) states "Fishers no longer occur in the northern Sierra Nevada or the Southern Cascades of California…"; thus no individuals will be affected by the proposed project.

The 2004 SNFPA ROD identifies large trees, large snags, large down wood and higher than average canopy closure as habitat attributes important to fisher. CWHR types 4M, 4D, 5M, 5D and 6 are identified as being important to fisher. A vegetated understory and large woody debris appear important for their prey species. Due to the wildfire, very little suitable mid to late seral (4M, 4D, 5M 5D, 6) forest exists within the analysis area (Table 3).

The proposed action alternatives would remove dead trees ≥16" dbh (≥14" dbh on tractor ground) from high and moderate severity burned areas that do not support habitat considered suitable for fisher. There may be instances where individual live trees may be cut for safety purposes or to facilitate access to harvest fire-killed trees. These instances are expected to be rare and impacts to existing live tree stands minimal. These actions would not reduce live tree canopy cover or degrade any denning, resting, dispersing, traveling, and foraging habitat for fisher. The present condition of late-successional forest habitat within the analysis area would not change from the existing condition created by the wildfire. There would be no change in the open road density. Thus, no fisher habitat would be logged, degraded and/or rendered unsuitable by the proposed actions.

The **California wolverine** was recently (February, 2008) photo verified as being present in the Sagehen Creek area of the Tahoe National Forest. This is the first confirmed detection of this species in many years in the Sierra Nevada (most recent verifiable record in California is 1922, Aubry et al, 2007). Its presence gives a bit more credibility to the reported sightings found in the Plumas NF database, although there are no verifiable records of wolverine within the northern Tahoe/Plumas/Lassen area since 1827 (Ibid). Most "sightings" within the Tahoe/Plumas/Lassen NF's are anecdotal, that is not verifiable by physical evidence or documented in published or archived records (Ibid). The majority of sightings on the Plumas NF occur in the Lakes Basin area. Incidental sightings of wolverines have been reported on the Tahoe National Forest. Schempf and White (1977) reported three recorded sightings in the Weber Lake area of Sierra County. Sightings on the Downieville District are adjacent to or within Lakes Basin area: one in 1989 in the Haskell Peak area, one in 1990 in the Upper Sardine Lake area, one in 1993 along the Gold Lake Road and Salmon Lakes Road area, and one in 1998 near Basset's Station. All of these Downieville Ranger District sightings have the potential to be within the home range of a single individual. A sighting, which occurred in 1994 on the Sierraville Ranger District, Tahoe NF, was located in sagebrush/eastside pine habitat near Sierra Valley (Youngblood, 1994 pers. comm. w/ Wilson).

Wolverines are wide ranging species with very large home ranges. Researchers have generally agreed that wolverine "habitat is probably best defined in terms of adequate

year-round food supplies in large, sparsely inhabited wilderness areas, rather than in terms of particular types of topography or plant associations" (Ruggerio et al 1994). Wolverines are generally considered a solitary species, with adults apparently associating only during the breeding season (Butts 1992). Home ranges of opposite sexes overlap (Powell 1979, in Ruggiero 1994). However, partial overlap of home ranges of some wolverines of the same sex is common (Ruggiero et al. 1994). Studies indicate that home ranges in North America may vary from less than 38.6 square miles to over 347.5 square miles. Males have larger territories than females. Individuals may move great distances on a daily basis; 15 to 30 miles a day is common for males, and some individuals have moved 60 to 70 miles in a single day. Except for females providing for offspring, or males seeking mates, movement is generally motivated by food (Ruggiero et al. 1994). Although wolverine are primarily nocturnal, diurnal movement is often recorded. During summer, long distance movements appear to be restricted to night when temperatures are cooler (Hornocker and Hash 1976).

Forest cover may be an important habitat requirement but they "are found in a variety of habitats and do not appear to shun open areas..." (Ibid, 1994). Hornocker and Hash (1981) indicated that wolverines may be reluctant to cross openings, i.e.: clearcuts, burned areas, meadows but also noted that wolverines "occasionally crossed clearcuts,...usually crossed in straight lines and at a running gait...,". These researchers also noted that "...no differences in movements, habitat use, or behavior was noted between wolverines occupying the half of the area that was logged and the half that was not." Aubry et al 2007 provides a strong case of linking verifiable wolverine detections with alpine meadows and barren areas, indicating that these high elevation, wilderness type openings are used by this species.

Winter cover is not as critical for wolverines as for marten and fishers because they move down in elevation following prey. Wolverines are solitary animals that avoid human contact and are rarely seen. Management actions such as roads, recreational activities, mineral extractions, and other activities that decrease wild, isolated refugia, continue to threaten wolverine habitat, as well as disrupting habitat use patterns within an individual's home range.

Virtually all reported wolverine den sites are relatively long, complex snow tunnels that may or may not be associated with large structures, such as fallen trees or boulders (in Aubry et al 2007). Spring snow cover was the only habitat layer that fully accounted for the distribution of historical wolverine records in the western mountains (Ibid). “If the persistence of wolverine populations is linked to the availability and quantity of relatively deep snow for reproductive den sites, insufficient snow cover during the denning period could play an important role in limiting their distribution” (Ibid). Wolverine reproductive habitat conditions (availability of alpine/subalpine areas supporting spring snow cover) become increasingly fragmented in the more southerly regions of the species range and influences wolverine distribution (Ibid).

The Moon-Wheeler analysis area is well roaded, has been logged numerous times in the last 50 years, receives a high degree of human use, and essentially does not provide

"sparsely inhabited wilderness" or alpine/subalpine habitat that supports deep, quality snow through the breeding period (mid April to mid-May). Based on latest vegetation mapping, there is no habitat identified in the Moon-Wheeler project area as subalpine (CWHR SCN). This habitat type is distributed within the Sierra Nevada ranging from 9000 to 11,000 feet (Mayer, et al 1988). There is no location on the Plumas NF above 8,372 feet elevation. There have been no sighting reports of wolverine within or near the analysis area. Obviously the Sierra Nevada population, once thought non-existent, consists of at least one individual. The risk to this individual, and to other individuals if they exist, from dead tree removal as proposed in the analysis area, is felt to be very low to non-existent. Many unknowns exist for this species and this 2008 detection. Based on the above habitat descriptions, it is determined that the analysis area does not support attributes associated with wolverine habitat and the project itself will not affect wolverine.

In 2000, the USFWS was petitioned to list the North American wolverine within the contiguous United States as a threatened or endangered species. In 2003 the USFWS published a finding that the petition did not present substantial information indicating that listing was warranted. A lawsuit was filed in 2006 alleging that the USFWS used incorrect standards to assess the petition, and the Montana U.S. District Court ordered the USFWS to conduct a new status review. On March 11, 2008, the USFWS published in the Federal Register that protecting the wolverine in the contiguous United States as a threatened or endangered species under the Endangered Species Act is not warranted. The USFWS determined that the wolverine population in the contiguous United States is not discrete, because it is not separated from wolverine populations in Canada, and is likely dependent on them to some degree for maintaining genetic diversity.

The Moonlight and Antelope Complex fire area does contain suitable habitat for the **Foothill yellow-legged frog**, **Sierra Nevada red fox**, and **Townsend's big-eared bat** but these species are not considered to be present in the analysis area, therefore no individuals should be affected by this project.

B. Species with a May Affect Determination

The implementation of the project may affect individuals of the following USFS sensitive species listed in Table 6 but the proposed project would not result in a trend toward federal listing, or result in a loss of viability, for any of these species.

Table 6. USFS Sensitive Species – May Affect Individuals Determination

Scientific Name	Common Name	Suitable Habitat Present	Observed in Project Area (Y/N)	Finding
Rana sierrae	Mountain Yellow-legged Frog	Yes	Yes	MAI
Haliaeetus leucocephalus	Bald Eagle	Yes	Yes	MAI
Strix occidentalis	California Spotted Owl	Yes	Yes	MAI

occidentalis				
Accipiter gentilis	Northern Goshawk	Yes	Yes	MAI
Martes Americana	American Marten	Yes	No	MAI
Antrozous pallidus	Pallid Bat	Yes	No	MAI
Lasiurus blossevilli	Western Red Bat	Yes	No	MAI

Finding:

MAI = May Affect Individuals, but is not likely to result in a trend toward Federal listing or loss of viability.

The rationale for the may affect determination for the species listed in Table 6 follows and is presented in the following sequence:
1. General direct and indirect effects of action alternatives on habitat.
2. General cumulative effects of action alternatives.
3. Species Specific effects

General Direct & Indirect Effects of Action Alternatives on Habitat

Direct effects include immediate changes in habitat conditions and disturbance or harassment of individual animals, including direct mortality, during project activities. Indirect effects include changes that occur later in time, such as long-term changes in habitat structure, or changes in human uses within the project area. Indirect effects can also include effects to a species' prey base.

Potential direct effects include removal of fire-killed or fire-injured trees, downed woody fuel, and subsequent reforestation. Fire-killed or hazard tree removal over the analysis area would occur on approximately 14,755 acres (18%) under Alternative A, 8,536 acres (12%) under Alternative C, 5,656 acres (8%) under Alternative D, and 4,389 acres (6%) under Alternative E. There may be instances where individual live trees may be cut for safety purposes or to facilitate access to harvest fire-killed trees. These instances are expected to be rare and impacts to existing live tree stands minimal. Therefore, the project would not directly affect the following CWHR types: mid seral coniferous in all canopy covers size 4 trees, late seral closed canopy coniferous in all canopy covers size 5 trees, or medium and large snags in green forest. There is the potential for short-term displacement of wildlife due to post-fire logging activities.

The four action alternatives include reforestation of conifers to promote the reestablishment and development of a mature, closed canopy, mixed conifer forest. Alternatives A, D, and E propose to reforest approximately 16,006 acres and Alternative C proposes to reforest approximately 9,306 acres. Conifer planting would occur as early as one year after dead tree removal. The Montane chaparral type would be converted to Sierra Mixed Conifer types 1 and 2 (shrub/seedling/sapling) after reforestation where conifer seedlings would be competing with brush for the next 2 to 5 decades.

Snag retention areas have been designed into each alternative and range in size from 7 to 26 acres. Under alternative A snag retention areas were designated over approximately

ten percent (up to 1,060 acres) of salvage treatment areas. Alternative C and Alternative D have 580 acres (14%) and 127 acres (10%) designated, respectively, as snag retention areas. Dead tree removal generally would not occur within these snag retention areas. Primary selection criteria for snag retention areas were 1) areas formerly identified as Spotted Owl PACs, 2) along treatment unit boundaries adjacent to non-burned and low severity areas, 3) within RHCAs, and 4) in stands that supported a minimum of 40% canopy cover pre-fire.

Within treatment units, the proposed action (alternative A) calls for the removal of dead trees 14" or 16" dbh and larger. Within helicopter and skyline units this would result in the retention of smaller dead trees (<15.9" dbh) scattered and clumped across all 6,219 acres of helicopter and skyline units. As indicated in Attachment 1, this small dead tree density would be around 32 dead trees/acre between 10" and 14.9" dbh. In the tractor units under all action alternatives, as a result of both sawlog and biomass proposed for harvest, there would be no small dead tree availability, except in snag retention areas, RHCA equipment restriction zones, and dead trees within 150 feet from the road prism (123 road miles to be treated) that are not deemed hazardous. For detailed information regarding the predicted amount of dead and live trees remaining post treatment see Table 4.7 in the the Moon-Wheeler Forest Vegetation, Fuels, Fire, and Air Quality Report (USDA Forest Service 2009b)

General Cumulative Effects of Action Alternatives.

Cumulative effects are defined as: "The impact on the environment which results from the incremental impact of the action when added to other past, present, and foreseeable future actions regardless of what agency (Federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively substantial actions taking place over a period of time" (40 CFR 1508.6).

Effects from the Moonlight and Antelope Complex wildfires and subsequent vegetative succession: Individual animals were probably killed by the fire, although there is no evidence that any of the TES species discussed in this document were killed. The susceptibility of animals to direct mortality by fire depends on the animals' relative mobility and habits: most birds are able to escape a fire, as are most deer; small rodents can burrow into the ground, thus escaping a low to moderate intensity fire. In a high intensity fire, some individuals may not be able to escape. Rodent populations that occupy forested stands are probably exterminated in high-intensity fire (Haim and Izhaki 1994). However, Lyon and Marzluff (1985) suggest that ". . . direct mortality, even in large forest fires, is a relatively unusual event."

Due to habitat changes as a result of the fire, a portion of resident wildlife could be displaced into adjacent areas that are of lower quality habitat or into adjacent areas that are currently occupied. This may cause stress to the individuals occupying the current areas and the individuals being displaced. Competition for available resources may lead to the death of individuals, reduction in the health of individuals, and/or reduction in reproductive success of individuals. This effect may have already occurred within the area.

The effects of the fire on habitat varied by species and by fire intensity. Where the fire was stand-replacing, habitat for species such as the spotted owl was greatly reduced or eliminated. In the partially burned areas, it may have improved habitat for the same species in the following ways: by creating more snags (which in the future would lead to more downed logs); by encouraging understory growth, a key component of many prey species' habitat; by opening up stands and so perhaps improving foraging efficiency.

Herbage production and brush species growth has been seen to improve on sites following wildfire (Campbell et al. 1977; Grifantini 1991; Haim and Izhaki 1994). In forest communities, shrubs decrease in vigor and number because of succession (Gruell 1980). Fire often increases sprouting and seed germination of brush (Gruell 1980; Noste 1985).

Disturbances within Sierra Mixed Conifer on the Plumas National Forest usually results in a diverse, fire adapted shrub component. Within the project area, shrubs that increase after fire include snowbrush ceanothus (*Ceanothus velutinous*), whitethorn ceanothus (*C. cordulatus*), deerbrush (*C. integerrimus*), bittercherry (*Prunus emarginata*), greenleaf manzanita (*Arctostaphylos patula*), and black oak (*Quercus kelloggii*), including mast. The shrub community that develops after perturbations such as wildfire exhibit vegetative characteristics of montane chaparral. Many species exhibit a succession pattern after a fire, corresponding to the vegetation succession pattern (e.g., rodents [Haim and Izhaki 1994], birds [Huff et al. 1985], reptiles [Greenberg et al. 1994], mammals [Hunter1990]). The same pattern can be expected in the Moon-Wheeler analysis area.

With time, the shrub community would recede as conifer tree succession develops into forested stands; the forested stands would have an increasingly higher amount of trees. Without reforestation, it may take over 125+ years for isolated, forested stands to develop into marginal habitat for old forest species. Most of the area would be dominated with montane chaparral species.

The average tonnage of woody debris would fluctuate over time. Trees killed in the Moonlight and Antelope Complex fire perimeters would fall over. Live green trees isolated by the fire could also be more susceptible to blowdown. Down logs would decay and become organic material in the soil profile. (The rate of snag fall would vary with dbh and species and the rate of downed log decay would vary with size of material and species [Lyon 1977, Raphael and Morrison 1987, Cluck and Smith 2007]).

Reforestation of national forest lands where no salvage harvest is proposed began within the analysis area in spring 2008. A combination of low density wide spaced cluster planting in the Antelope Lake and Babcock Peak areas and low density square-spaced planting in the Camp 14 area occurred within areas of high fire severity accounting for a total of approximately 838 acres planted in 2008. During the summer of 2008, the Frazier Cabin Reforestation Project included 141 acres of mechanical site preparation which accounts for 0.16 percent of the analysis area and consequently results in a negligible contribution to cumulative effects. Approximately 10,500 acres of high severity, unsalvaged areas were planted in Spring 2009 across the Mt. Hough and Beckwourth Ranger District portions of the Moonlight and Antelope Complex fires

utilizing a combination of low density planting arrangements. These additional acres of reforestation occurred in unsalvaged areas of the fire including old plantations and natural stands. Manual release treatments would occur within one to two years following planting. The net cumulative effect would be the enhanced establishment of conifer seedlings across the analysis area in order to re-establish forested conditions.

With reforestation planned with the action alternatives, the montane chaparral would be set back with site prep, and the area planted to conifers. This shrub/seedling/sapling stages (SMC1 and SMC 2) may last 10-40 years. If tall shrubs capture the site, it may take an additional 10-15 years for trees to start dominating the site. With plantation maintenance (release, pre-commercial thin) the time period would be shortened to achieve a conifer dominated site. In this case, it would take an estimated 60 years before the burned stands, which are now brush, to develop into size class 4 trees (12" dbh trees) and approximately 100 years to develop into CWHR 4M stands. These forested stands would provide habitat for such species as northern goshawk and California spotted owl.

As conifer trees establish, they would use more of the water once available to understory vegetation. Kattelmann (1999) stated that the present situation in the Sierra Nevada (i.e., increased density of vegetation) may decrease water yields somewhat over the situation under natural fire regimes.

If wildfire suppression were successful in the future, the amount of late-successional-stage habitat could increase over time as these type of stands develop from severely burned stands that are regenerated. Fragmentation of the late-successional-staged habitat could be reduced as stands develop. Reforestation planned under action alternatives would, with time and effort, reduce fragmentation; without reforestation (Alternative B), forested habitat may remain fragmented longer.

Future wild and prescribed fire can have an effect on species through habitat alteration and direct impacts to individuals. Fire can either enhance or destroy habitat by its effects on the environment. This depends on the intensity of the fire. A low-intensity fire that lowers young tree densities could be beneficial for spotted owls (USDA Forest Service 1993) and goshawks (Fowler 1988; Reynolds et al. 1992) by increasing foraging efficiency. If fire intensities are at a higher level, then crown cover may be reduced. The resulting condition may not provide good habitat for prey of many of the sensitive terrestrial species. Direct loss of individuals from intense fires is a possibility. If stand-replacing fires were to occur in breeding areas during successful nesting periods, the loss of the viable offspring would be possible.

Dead Tree Removal. The removal of fire-killed trees through salvage logging has been documented in published literature and syntheses to have adverse long term effects on residual forest structure by removing the "biological legacy" component and subsequent recruitment necessary for habitat and ecosystem function (McIver and Starr 2001, Beschta et al 2004, Hutto 2006, Lindenmayer and Noss 2006, Reeves et al 2006). Such biological legacies include standing snags (both large and small), live fire-damaged trees, large down woody debris that serve as important components to habitat and ecosystem processes.

Two roadside safety and hazard tree removal projects (Antelope Complex on the Mt. Hough R.D. and Dry Flat on the Beckwourth R.D.) were implemented in 2008. These two projects removed hazard trees from approximately 3,330 acres within the analysis area.

There are two additional Forest Service projects currently being planned that would remove fire-killed trees within the analysis area. The Camp 14 and North Moonlight projects are fire salvage projects proposed by the Beckwourth Ranger District, Plumas National Forest, and the Eagle Lake Ranger District, Lassen National Forest, respectively. The Camp 14 project is completed while the North Moonlight project is currently under contract and ongoing. These fire salvage projects are limited to less than 250 acres in size, and occur in separate watersheds. Both of these projects include harvesting fire-injured trees in the interest of capturing the value of those trees which were substantially injured by the fire and likely to die in the near future; however, since these projects also primarily target areas of high to moderate burn severity where greater than 50 percent of the basal area was killed, most trees harvested would be dead, fire-killed trees. The contributions of these two projects to cumulative effects include a localized reduction in snags, in snag recruitment from fire-injured trees, and in high burn severity forest structure. These two projects would affect 0.7 percent of public lands within the analysis area and represent the smallest contribution towards cumulative effects to forest vegetation, fuel loading, fire behavior, or air quality within the analysis area. Due to the size, scale, and, in the case of Camp 14, the dispersal of such activities, these localized effects would be minimal when considering the extent of the analysis area.

Cumulatively (after all other hazard tree removal and fire salvage projects within the analysis area are included) all action alternatives would exclude salvage and roadside hazard logging entirely from the majority of public lands: 73% would be left untreated under alternative A, 82% under Alternative C, 86% under Alternative D, and 88% under Alternative E. Consequently, large areas of unsalvaged and untreated areas would exist under all action alternatives, maintaining forest stand structure that would provide for biological legacy values as described by Lindenmayer and Noss (2006). In addition, snag retention areas within salvage harvest units and exclusion of salvage harvest from low to moderate burn severity patches would provide for biological legacies within and outside the proposed treatment perimeters such as fire-killed and fire-damaged trees and large live and dead trees that have high habitat value (Lindenmayer and Noss 2006). The habitat patchiness that is present within much of the untreated areas on public lands, due to the effects of fire severity and what vegetation types existed pre-fire, may be beneficial to the spotted owl (Bond et al. 2002) and other wildlife species that use recently burned forests (Hutto 2008). Equipment restriction zones (in units where ground-based logging is proposed) and snag retention guidelines within RHCAs are designed to provide for protection of aquatic ecosystems and retain and recruit structure such as large down woody debris within riparian areas (Lindenmayer and Noss 2006, Reeves et al 2006).

Snag Densities and Down Woody Material

Snag density estimations post treatment on Forest Service lands within the analysis area has been conducted. Snag numbers reflect cumulative effects, that is, all FS projects ongoing or proposed that are/would remove fire-killed trees, and are **averaged** across the landscape (FS acres within the analysis area – 68,408 acres).

Based on data derived from stand exam data within the Moon-Wheeler Project implementation of all projects under Alternative A results in an estimated post harvest snag density (>15" dbh) across the 68,408 FS acres of 11.7 snags/acre. The cumulative amount of snags 10"- 14.9" dbh post harvest under this alternative is estimated to be 26 snags/acre.

Under Alternatives C, D, and E the cumulative estimate of snags greater than 15" dbh post harvest is estimated at 13.3 snags/acre. The estimated amount of snags 10"- 14.9" dbh remaining post harvest is the same as Alternative A, 26 snags/acre.

All action alternatives would retain snags >15" dbh at or above levels recommended by Bull for viable populations of cavity nesters in ponderosa pine and mixed conifer in both open canopy forest as well as old growth stands (Bull et al 1997).

Reductions of large woody debris are directly related to effects of the wildfire where much of the pre-existing woody debris was consumed. Salvage harvesting treatments would not remove existing down woody debris, and would likely contribute to large woody debris in the short-term by leaving cull log material within units.

Treatments in all action alternatives include snag retention areas and snag recruitment within RHCAs, both of which retain snags that would serve as recruitment for large woody debris. Within RHCAs, generally four of the largest snags per acre would be retained, preferably within falling distance of the channel where available, to provide for large down woody debris recruitment to best meet riparian management objectives. Average tons per acre of large woody debris (as represented by surface fuels greater than 12 inches in diameter) within snag retention areas and untreated areas (as represented under the no action alternative) and treated areas (including RHCAs) is shown in Table 7 (taken from Moon-Wheeler Project Forest Vegetation, Fuels, Fire, and Air Quality Specialist Report, pg. 59 – in project record)

.

Table 7: Large woody debris amounts and recruitment in the project area.

	Alternative A	Alternative B	Alternative C & D	Alternative E
Avg. Tons/Ac of Large woody debris (short-term: Post-harvest)	within treated areas: 1.1 - 4.3 within snag retention areas: 0.5	All areas: 0.5	within treated areas: 1.1 – 1.3 within snag retention areas: 0.5	with in treated areas: 1.1 – 1.3 All other areas: 0.5
Avg. Tons/Ac of Large woody debris (long-term: 30 years)	within treated areas: 0.8 – 10.8 within snag retention areas: 12.4	All areas: 12.4	within treated areas: 0.8 – 4.4 within snag retention areas: 12.4	within treated areas: 0.8 – 4.4 All other areas: 12.4
Avg. number of snags > 15" available for large woody debris recruitment to streams (Short-term: Post-harvest)	4 - 6 snags per acre in treated RHCAs	>15.6 snags per acre	4 – 6 snags per acre in treated RHCAs	>15.6 snags per acre

These values were used along with acres by treatment and pre-fire vegetation type to estimate a weighted average of large woody debris within the treatment units and project area as shown in Table 8 (taken from Moon-Wheeler Project Forest Vegetation, Fuels, Fire, and Air Quality Specialist Report, pg. 59 – in project record).

Table 8: Weighted average tons per acre of large woody debris in the short term (post-harvest) and the long term (30 years) within the treatment units and project area.

	Treatment Units		Project Area	
	Post Harvest	30 years	Post Harvest	30 years
Alternative A	1.5	5.3	1	6.4
Alternative B	--	--	0.6	9.3
Alternative C & D	1.1	2.8	0.7	7.4
Alternative E	1.1	2.8	0.6	9.3

As discussed above, the fires consumed much of the existing large woody debris throughout the analysis area. Salvage harvesting treatments would not remove existing down woody debris and, in the short-term, would likely contribute to large woody debris; however, in the long-term, action alternatives that remove dead trees would reduce recruitment of large woody debris.

It should also be noted that silvicultural guidelines specify harvest of dead trees only. Post-fire mortality of fire-injured trees, particularly within moderate and high vegetation burn severity areas, would occur in the first three to five years immediately following the fire event. Snag recruitment and large woody debris recruitment would continue to occur within untreated areas as well. Snag retention and recruitment of large woody debris would occur on 73 (alternative A) to 88 (alternative E) percent of public lands which would not be subject to project proposals.

Wildfire Suppression/Rehab efforts for Moonlight and Antlelope Complex fires. Suppression tactics taken during the Moonlight and Antelope Complex fires affected habitat. The tactics included air drops of water and retardant, back burning, construction of control lines by bulldozers, construction of hand lines, live-tree and snag falling, and construction of staging areas, and drop points.

There is no record of how many gallons of retardant was used on the two fires. The retardant that was used is Gum-Thickened Fire-Trolo (GTS-R). Studies have shown that similar retardants, at the levels at which they're applied, exceed the acutely toxic concentrations reported for a range of aquatic species, including rainbow trout (*Oncorynchus mykiss*), chinook salmon (*Oncorynchus tshawytscha)*, Daphnia (*Daphnia magna*), mayfly nymphs (*Epeorus albertae*), and stonefly nymphs (*Hesperoperia pacifica*) (Adams and Simmons 1999; Buhl and Hamilton 2000; USDA Forest Service 2000d).

The Guidelines for Aerial Application of Retardants and Foams in Aquatic Environments (USDA Forest Service 2000c) were followed during the Moonlight and Antelope Complex incidents. These guidelines acknowledge that retardant may enter waterways even when the guidelines are followed. Since many of the retardant drops were made near waterways,

retardant may have entered several fish-bearing perennial creeks; there was no evidence that it entered either Antelope or Taylor Lake. There was no reported fish kill in any of these waterways.

In the Biological Assessment/Evaluation of Aerially Delivered Fire Retardant Guidelines (USDA Forest Service 2000a), the determination for sensitive species was as follows:

> . . . that implementing the Guidelines for Aerial Application of Retardants and Foams in Aquatic Environments from August 2000 to December 2001 may affect Forest Service sensitive species, but will not result in a loss of species viability or create significant trends toward federal listing. From these determinations it can be concluded that the use of retardants on the Moonlight and Antelope Complex fires did not have a major effect on TES species.

Suppression activities altered habitats in several ways: by removing vegetation; by possibly increasing siltation to streams; by possibly compacting soils; by possibly introducing or spreading noxious weeds. Such activities may have been a major source of disturbance to animals.

Fire suppression rehabilitation activities included the following: returning roads, helispots, safety islands, water sources, and fences to the pre-incident condition; applying erosion control measures such as waterbar construction to dozer and handlines; removing debris deposited as a result of suppression efforts from stream channels, and dragging back vegetative debris onto dozer lines.

Burned Area Emergency Rehabilitation (BAER) activities were taken to mitigate effects of both fires which might cause an emergency to life, property, or resources. Rehabilitation efforts were concentrated on restoration and improvement of drainage functions to control water to reduce damage to roads and subsequent erosion and off-site sediment deposit. Actions included placement of rock on road drainages, culvert maintenance, installation of dips and rock armor at fill slopes for drainage, as well as installation of geo-tech fabric for sediment control. An administrative closure of roads within the fire was also implemented to keep the public out of the burn area. The erosion control measures could all have a positive effect on TES species by maintaining soil and site productivity. Reduction of siltation caused by the fire would especially benefit aquatic species. .

Fire has been recognized as being a contributing factor to later insect problems (Ferrell 1996). Less intense burns may reduce insect populations in the area through the production of smoke and heat. Fires commonly cause tree wounds, with their severity being related to fire intensity. The wounds can serve as infection routes for tree diseases. The result in the fire area may be an increase in insect and pathogen attacks, and subsequent mortality, over what would have occurred had the fire not taken place. The work of pathogens can be beneficial to several wildlife species. For example, butt rots can create trees suitable for nesting and denning habitat.

Post-fire Salvage and Reforestation on Private timberlands. Private lands account for over 19,000 acres or approximately 22 percent of the analysis area. Since fall 2007

through the present, fire salvage harvest has been occurring on these lands. Approximately 4,073 acres were planned for salvage harvest in 2007 and fire salvage timber harvest plans filed to date in 2009 account for an additional 7,381 acres approximately. Based on current activity, private fire salvage projects occur mostly on productive, well-stocked stands that burned with moderate to high burn severity resulting in a notable reduction in densities of fire-killed and fire-injured trees on private lands. It is reasonably assumed based on state forest practice regulations and private timber practices that these areas would be re-planted and managed for maximizing tree growth.

Proposed Herger-Feinstein Quincy Library Group Fuel Treatment Projects. Future Herger-Feinstein Quincy Library Group projects that may occur within the analysis area include the Wildcat Project (2009) and the Keddie Project (2009). These projects would include Defensible Fuel Profile Zone fuel treatments, area thinning treatments, and group selection treatments which would involve timber harvesting and include silvicultural prescriptions which involve thinning from below to reduce hazardous accumulations of ladder and canopy fuels and promoting shade intolerant species. These projects would focus on harvesting green trees and would likely be modified to avoid areas affected by the fire; particularly areas that burned with moderate to high severity. Contribution to cumulative effects would include localized reduction of stand densities through timber harvest focusing on the removal of trees less than 30 inches diameter and the removal of snags. No treatment units from either the Wildcat or Keddie projects would overlap with treatment units in any action alternatives. Approximately 155 acres of these projects (75 acres from the Wildcat Project and 80 acres from the Keddie Project) may occur within the analysis area; this would account for 0.2 percent of the project area. Consequently, the contribution of these projects to cumulative effects would be negligible since 1) treatments would occur in low severity areas, 2) prescriptions would be focused on maintaining mature forest cover and reducing hazardous fuel conditions, 3) the units are geographically disparate, and dispersed from the action alternatives, and 4) the vast majority of the units occur outside of the analysis area and the perimeter of the fires.

Livestock grazing. The analysis area occurs within the boundaries of nine active livestock grazing allotments, the majority of which is composed of the Clarks Creek, Lights Creek, and Lone Rock allotments (Table 8). Grazing capacity within allotments is based on the primary range (meadow systems) and not on secondary or transitory range. At this time there are no plans to increase livestock stocking rates or use due to the increase in transitory range created by the fire. Based on the existing stocking rates and current range conditions, the season of use, the distribution of primary range across the project area, as well as no increased stocking due to increase in transitory range, there should be no change in livestock effects to habitat conditions over the long term (5+ years).

Table 8: Grazing Allotment information within Analysis Area

Allotment	Acres in Project Area	Number of Livestock	Season of Use
Fitch Canyon	32	317	June 3 to Sep 2
Bass	257	64	June 1 to Sep 30

Doyle	355	100	June 1 to Sep 15
Antelope Lake	772	150	Sep 3 to Oct 4
Jenkins	1488	600	August 1 to Sep 1
Antelope	2190	207	June 14 to Oct 8
Hungry Creek	10556	VACANT	VACANT
Clarks Creek	12185	207	June 1 to Oct 1
Taylor Lake	13750	VACANT	VACANT
Lights Creek	17437	24	June 1 to Sep 1
Lone Rock	26815	116	June 16 to Sep 15

Within the nine active grazing allotments in the fire perimeters there is expected to be minimal impacts to critical riparian areas due to the following reasons: 1) cows did not graze burned areas in 2008, the season after the wildfires, therefore riparian vegetation have had a full year of rest to resprout, 2) the increase in transitory (upland) range 2-5 years after the fires may take some grazing pressure off of the meadows and riparian areas with a flush of dryland grass/forbs that livestock may find palatable, and 3) long term recovery will be unimpeded through strict adherence to use standards which are: 20% willow use, 20% aspen use, 20% bank alteration, and 50% meadow use. Cows are removed from the pasture when any one of these triggers are reached. In addition, the Lower Lone Rock Creek watershed, which supports a well distributed population of MYLF's on Forest Service land, is scheduled to have a 1.5 mile temporary electric fence constructed in spring, 2009, before the cattle are turned out, which will prevent grazing in that reach of the watershed, further allowing riparian vegetation and streambanks to recover.

Recreation. With all alternatives, accessibility in the area to motorized traffic would remain the same. There are no designated off-highway-vehicle (OHV) routes in the analysis area. Some OHV use does occur at a very low level. OHV use can compact the soil to the point where plant growth is inhibited, if not stopped. OHV use may increase disturbance, even possible harassment, of wildlife species and may cause erosion. Erosion affects plant growth, a key component of wildlife habitat. It also affects water quality, which affects habitat for aquatic and semi-aquatic species. Because of the expected low level of OHV use, these effects are expected to remain minimal.

Other forms of recreation may also cause disturbance to wildlife species. Use of the Antelope Lake to Taylor Lake Trail would probably remain similar as it was pre-fire. Human users would be more visible to wildlife species using early seral forest habitat, which may elicit fright/flight responses more than when the trail was enclosed under a

forested canopy. Again, because of the low level of recreation use of the trail the effects of this disturbance are probably minor.

Past road building has impacted many species through both habitat loss from road building and elevated levels of possible disturbance from management activities and public access. Several roads that were previously closed were opened for suppression efforts. These roads may have been closed by suppression rehab; most open roads in the area would remain open until the current road designation/OHV process is completed.

Firewood Gathering. The Personal Use Firewood program on the Plumas National Forest is an ongoing program that has been in existence for years and would continue. This program allows the public to purchase a woodcutting permit and remove fuel and firewood from National Forest lands. A 10-year average (1991-2000) indicates that 3,273 permits were issued annually resulting in the annual sale of 10,417 cords of wood on the Plumas. Since 1993 there has been a declining trend in both number of permits and cords sold (for the year 2000, 2,227 permits issued selling 6,392 cords). Much of this wood material either consists of down logs found in the forest, along forest roads, and within cull decks created by past logging operations, or as standing snags. The Moon-Wheeler analysis area is open to woodcutting. Snags and logs would continue to be removed, resulting in the cumulative loss of these habitat components across the landscape. Snags are recruited annually from live trees through natural processes at a rate that may sustain this loss within the analysis area; snag and log removal is most common along, or within a short distance from, open roads. More area would be accessible to woodcutting with the no action alternative, as no existing roads would be closed.

Additional cumulative effects, such as past wildfires, past salvage of wildfires, and current or proposed hazard tree and salvage projects within the analysis area are specifically addressed below for each species under the cumulative effects section.

Species Specific Effects

Mountain Yellow-legged Frog

Mountain yellow-legged frogs (MYLFs) are seldom far from water. They prefer well illuminated, sloping banks of meadow streams, riverbanks, isolated pools, and lake borders with vegetation that is continuous to the water's edge (Martin 1992, Zeiner et al. 1988). MYLF prefer open stream and lake margins that gently slope up to a depth of 12-20 inches. Tadpoles and adults of this species overwinter in deep pools with undercut banks that provide cover (Martin 1994). Since the adults and tadpoles overwinter underwater, in high elevations they are restricted to relatively deep lakes (over 5 feet deep) which do not freeze solid in winter (Knapp 1994, per. comm.).

Suitable breeding habitat for mountain yellow-legged frogs is considered to be low gradient (up to 4%) perennial streams and lakes. Streams in this category generally have the potential for deep pools and undercut banks which provide the habitat requirements of this frog. In high elevations, breeding occurs between May and August as soon as the

meadows and lakes are free of snow and ice. In lower elevations, breeding occurs between March and June once high water in streams subsides. Mountain yellow-legged frogs usually lay their eggs in clusters submerged along stream banks or on vegetation. Tadpoles require at least one year before metamorphosis to the adult stage. Tadpoles in some high elevation populations may require up to three years before metamorphosis (Knapp 1994).

Adults primarily feed on aquatic and terrestrial invertebrates favoring terrestrial insects such as beetles, flies, ants, bees, and true bugs (Jennings and Hayes 1994). They are also known to feed on Yosemite toad and pacific treefrog tadpoles (Zeiner et al. 1988). Tadpoles graze on algae and diatoms along rocky bottoms in streams, lakes and ponds. Garter snakes and introduced trout prey upon mountain yellow-legged frog tadpoles (Zeiner et al. 1988). Due to the adults' overwintering underwater and the tadpoles' long metamorphosis, this species is very vulnerable to introduced fish (Knapp 1994). Ecorp, Garcia & Associates, and North State Resources completed amphibian surveys on approximately fifty miles of stream (for the Antelope Border/ Cold project, the Wild Project and Moonlight/Jura projects) within and adjacent to the analysis area in 2000 – 2006 with 6 adult, three subadults and eleven larvae Mountain yellow-legged frogs found, primarily in Lone Rock, Boulder, Thompson, and Pierce Creeks. Matthew and Associates completed amphibian surveys on 50 miles of streams within one mile of the Diamond Project Area in 2005, with no detections of MYLF. All consultants followed "A Standard Protocol for Surveying Aquatic Amphibians" (Fellers and Freel 1995).

In summary, three subwatersheds (and their associated creeks) within the Moon-Wheeler analysis area have had MYLF detections; West Branch Lights Creek, Lower Lone Rock Creek, and Pierce Creek. A fourth watershed, Lower Indian Creek, which is located adjacent to Pierce Creek and Lone Rock Creek watersheds and flows into Antelope Lake, is suspected of having MYLF, although no individuals have been detected (Ganda 2001, Tina Hopkins, pers. comm.). Lone Rock Creek supports a well distributed, moderate to low-density, population of MYLF. These populations are isolated due to the dam at Antelope Lake.

Dispersal studies are in their infancy for stream dwelling MYLF. One season of a three year radio-telemetry study was conducted in Lone-Rock Creek, with 20 frogs tracked from July through September of 2003. The objective of the study is to determine the dispersal behavior of MYLF in relation to steams and adjacent terrestrial habitat. This three year study continued in Bean Creek near Meadow Valley, California. Current findings are that adult frogs have territorial pools and stay near these pools throughout the summer. In the fall, as temperatures decline, female frogs have been found to move downstream within the stream channel towards male frogs. To date, the lateral movement of MYLF away from the channel is no greater than 23 meters (MGW 2006).

Action Alternatives (Alternatives A, C, D, and E) - Direct/Indirect Effects.
Potential direct effects from the proposed project include impacts to individual frogs during activities. Possible direct effects from the proposed actions on forest service aquatic sensitive species include crushing of individuals if they are present during project

activities. The use of a fellerbuncher within the RHCA and the potential location of landings within RHCAs has the potential of directly injuring or killing frogs. The burning of hand piles within the RHCA also has the potential of directly killing frogs. Although helicopter and skyline logging is considered to have minimal ground disturbing effects, falling of trees can result in crushing, injuring or killing of animals that occur where trees fall.

The potential for direct impacts to individuals is greatest during wet periods and in early fall, when frogs are most likely to disperse from aquatic habitats. The most recent telemetry results (MGW 2006) indicate that MYLF's lateral movement away from the channel is no greater than 23 meters. Telemetry studies suggest that the use of upland habitat by the mountain yellow-legged frog is very limited.

There are three subwatersheds that have known MYLF populations. Approximately 790 RHCA acres under alternative A would be treated in these watersheds for fire-killed tree removal. Table 53 displays the treatment acres within watersheds with known MYLF populations. Treatments within these RHCAs would increase the potential for direct effects, as frogs are put at risk of being killed/injured with falling and yarding activities. In terms of potential impacts along stream reaches with MYLFs, no treatment units are located along Lower Lone Rock Creek and Pierce Creek.

Table 10: Treatment acres within watersheds with MYLF populations.

Subwatersheds with MYLF Populations	Subwatershed Acres Treated	Acres treated in RHCA			
		Alt A	Alt C	Alt D	Alt E
L. Lone Rock C.	349	196	103	95	59
Pierce C.	319	105	105	105	93
West Branch Lights C.	1520	489	262	156	149
	Total	790	470	356	302

A possible indirect effect in helicopter and skyline cable units (under Alternative A only), because of the lop and scatter of limbs and tops, and the leaving of trees under 16 inches dbh, would be that the resultant ground cover within RHCAs immediately post harvest is likely to be higher than in untreated RHCAs outside of units. The same is not true for ground-based units which will transport most of the standing dead material out. There will be some amount of breakage that will be left on the ground but this volume is not easily quantifiable.

Treatments in all action alternatives include snag retention areas and snag recruitment within RHCAs, both of which retain snags that would serve as recruitment for coarse woody debris. Within RHCAs, generally four of the largest snags per acre would be retained, preferably within falling distance of the channel where available, to provide for large down woody debris recruitment to best meet riparian management objectives. Within ground-based salvage harvesting treatments, snag retention in RHCAs would be most preferable and efficient within equipment exclusion zones where snags would be

within reasonable falling distance of the channel for coarse woody debris recruitment and harvesting safety issues would be minimized due to equipment exclusion (Table 9).

Table 9:Equipment restriction zones for ground-based equipment based on stream type and slope class.

Stream Type	0-15% (feet)	15-25% (feet)	> 25% (feet)
Perennial	100	150	No mechanical
Intermittent	50	100	No mechanical
Ephemeral	25	50	No mechanical
Meadows and Wetlands	25	50	No mechanical

The use of water for dust abatement by drafting water from creeks is expected with the proposed actions and, especially during the summer months, could cause a change in the flow regimes affecting water quality. There is also the potential for individual tadpoles, egg masses, or amphibians to be taken up by the "drafting" process. A water drafting plan that will be implemented during the dust abatement process will reduce the potential of this occurring.

Sheltering habitat for amphibian species also includes landscape features that provide cover and moisture during the dry season within 300 feet of a riparian area. This could include boulders or rocks and organic debris such as downed trees or logs. A reduction in dead wood would result in a lack of connectivity and cover for frogs that could possibly move out of West Branch Lights Creek and into the floodplain, the RHCAs, and upland habitats. Possible indirect effects to frogs using the RHCA for dispersal, and over wintering may include a reduction in cover provided by woody debris, warmer and drier microclimate conditions due to removal of dead trees in RHCA areas, and reduction in connectivity provided by woody debris between aquatic habitats, RHCAs, and uplands. Cover for aquatic-dependent species and effective soil cover in this post-fire environment are very important for the proper functioning of aquatic and riparian habitats until vegetation can reestablish and provide these habitat elements (5-30+ years). As vegetation reestablishes, the role of the standing dead and downed wood would be reduced.

Action Alternatives (Alternatives A, C, D, and E) - Cumulative Effects.
The following discussion on watershed conditions within the analysis area is drawn from the Moonlight and Wheeler Fires Recovery and Restoration Project Watershed Report (USDA 2009c), which is hereby incorporated by reference.

There are 23 subwatersheds within the analysis area in which a cumulative watershed effects (CWE) analysis has been completed. The Equivalent Roaded Acre (ERA) method is used to assess cumulative effect of activities that alter hydrologic function and result primarily in alteration of runoff in project watersheds. The ERA method is essentially an accounting of the past, present and future impacts. Watersheds are rated as moderately sensitive by Forest staff when evaluated for use of the ERA method. Rating variables include erosion potential, slope steepness, amount of alluvial channels, risk of rain-on-snow and/or thunderstorm events, and re-vegetation potential. Using these ratings, a

Threshold of Concern (TOC) value is assigned for each watershed, beyond which an adverse effect might be expected. The TOC is generally expressed as a percentage of watershed area.

Seventeen of the 23 CWE watersheds are over thresholds set by the Forest, for management impacts that affect runoff; all but one are due to the effects of the fire (please see Table 7 of the Watershed Report). The exception, Moonlight Pass watershed is currently over threshold because of fire salvage harvest on private land. Seven of the watersheds determined over TOC are so in excess of 30 percent that it is reasonable to expect that under conditions of intense precipitation events that significant increases in runoff would occur. These watersheds are Indian below Babcock, Lonesome Canyon, Mid Lights Creek, Moonlight Pass, Morton, Smith and the West Branch of Lights.

Erosion from harvest slopes, and subsequent sediment delivery to channels is expected to be elevated over normal conditions because of lack of ground cover. But in the event of precipitation that initiates erosion the overall lack of ground cover on burned slopes will be the greater source. Harvesting creates areas of compaction and displacement of soils, leading to localized incidences of overland flow, but incorporation of RHCA equipment restrictions, BMPs, Forest Plan standards and regional soil productivity guidelines into project implementation would limit detrimental disturbances to soil to 15 percent or less of a treatment unit. Therefore actual harvest effects are a relatively minor proportion of the cumulative effects to watersheds.

Exposed, unprotected soil has the potential to move into the aquatic system as a result of the season's first significant rain. High levels of sediment can fill deep pools, alter and fill interstitial spaces in streambed materials with fine particulates, change flow characteristic, reduce dissolved oxygen, and restrict waste removal (USDA 2007). Other effects from the two wildfires to MYLF are a reduction of the input of leaf fall and insects from floodplains into streams, which could contribute to a decrease in a primary food source. A reduction in availability of this organic material may result in poor survival of tadpoles to metamorphosis. Organic debris serves as concealment for larvae, and loss of such hiding cover makes the larvae more susceptible to predation. These factors could contribute to declining population trends.

Two of the three watersheds with known MYLF populations, Lower Lone Rock Creek and West Branch Light Creek, currently are above the Threshold of Concern (TOC). These two watersheds are susceptible to very high cumulative effects risk, such as erosion and large movement of sediment into streams. Table 10 displays the cumulative conditions of watersheds with known/suspected MYLF populations for all action alternatives . Lower Indian Creek watershed, suspected of having MYLF but with no detections to date, is also over TOC and at very high risk. Pierce Creek watershed exists below TOC but the risk of cumulative effects is still considered high.

Table 10: Cumulative condition of subwatersheds with known/suspected MYLF populations

SubWatersheds	ERA	ERA (% of the TOC)*

	% TOC	Existing (no action)	Alt A	Alt C	Alt D	Alt E
Lower Lone Rock Creek	13	118%	128%	126%	125%	122%
Pierce Creek	12	80%	86%	87%	87%	85%
West Branch Lights C.	13	163%	190%	184%	172%	172%
Lower Indian Creek	12	132%	145%	145%	145%	142%

* ERA is shown as the percent of the TOC for each subwatershed. For example, a subwatershed that is above the TOC will have a total value greater than 100. Total ERA contributions less than 100 are below the TOC. As disturbance approaches and exceeds the TOC, the risk of detrimental watershed effects increases.

As Table 10 shows, the four action alternatives for the Moon-Wheeler Project would increase the percentage of TOC from existing conditions for all four watersheds. The cumulative risk assessment in all four of these watersheds is not expected to change from what exists currently. The West Branch Lights Creek watershed has the highest existing post-project cumulative risk. The bulk of the harvest, particularly by tractor, is concentrated in the tributary headwaters of Lights Creek drainage, which confluence in a single locale at the top of the Middle Lights Creek sub-watershed and therefore greater adverse effects are expected.

There is over 19,000 acres of private land within the analysis area. Cumulative effects from private land use (timber and gravel extraction, fire salvage harvest, livestock grazing, and urbanization) would continue to create water quality problems, including sedimentation and bank cutting. Of particular concern is the heavy logging on private lands within the West Branch Lights Creek and Lone Rock subwatersheds, which have known MYLF populations. The additive impact from private land logging on these and other drainages in the analysis area have been incorporated into the cumulative watershed effects analysis and is reflected in the high ERA values.

The analysis area occurs within the boundaries of nine active livestock grazing allotments, the majority of which is composed of the Clarks Creek, Lights Creek, and Lone Rock allotments. Grazing capacity within allotments is based on the primary range (meadow systems) and not on secondary or transitory range. At this time there are no plans to increase livestock stocking rates or use due to the increase in transitory range created by the fire. Based on the existing stocking rates and current range conditions, the season of use, the distribution of primary range across the project area, as well as no increased stocking due to increase in transitory range, there should be no change in livestock effects to habitat conditions over the long term (5+ years).

Within the nine active grazing allotments in the fire perimeters there is expected to be minimal impacts to critical riparian areas due to the following reasons: 1) cows did not graze burned areas in 2008, the season after the wildfires, therefore riparian vegetation have had a full year of rest to resprout, 2) the increase in transitory (upland) range 2-5 years after the fires may take some grazing pressure off of the meadows and riparian areas with a flush of dryland grass/forbs that livestock may find palatable, and 3) long term recovery will be unimpeded through strict adherence to use standards which are: 20% willow use, 20% aspen use, 20% bank alteration, and 50% meadow use. Cows are removed from the pasture when any one of these triggers are reached. In addition, the Lower Lone Rock Creek watershed, which supports a well distributed population of

MYLF's on Forest Service land, is scheduled to have a 1.5 mile temporary electric fence constructed in spring, 2009, before the cattle are turned out, which will prevent grazing in that reach of the watershed, further allowing riparian vegetation and streambanks to recover.

Determination: Application of BMPs will be used to lower incidence of surface erosion on the hill slope and prevent sediment delivery to the valley bottoms. Since 1992, the Plumas NF has conducted over 600 evaluations of BMP effectiveness per the approved R5 protocol. The most recent summary of this monitoring was produced following the 2007 field season (USDA 2008a). That summary listed 441 evaluations of BMPs for the type of activities proposed under the action alternatives. BMPs were rated as effective for 79.8% of those evaluations. When effects from roads already in use are separated from activity areas, BMP effectiveness is over 90%. Based on predicted hill slope erosion rates for skyline and tractor yarding in the first year after harvest (reported in watershed section), and considered along with observed recovery of riparian buffers and incorporation of BMPs, it is expected that actual rates of delivery to the valley bottom would be near the background rate for burned areas that are not harvested.

Significant vegetative recovery of riparian zones has occurred since the fire (based on 2009 surveys, see watershed section). These same surveys revealed that these riparian zones provided effective buffers for sediment deposition. In the three watersheds suveyed, Hungry, Lights and Moonlight Creeks, effectiveness of riparian area in mitigating rilling from upslope sources was estimated at about 80%, 60% and 90%, respectively. In each watershed pre-fire vegetation, and post-fire re-growth, along with litter cast, had developed ground cover to levels as high, or better, than the upslope condition. Typically, riparian vegetation, and associated breaks in slope at the valley bottom and near channel floodplain largely dissipate flow energy and induce deposition of transported fines. BMP effectiveness monitoring results for project-applicable activities on the forest are about the 90% level. Therefore sediment delivery to a channel buffer from an activity area is expected to be very slight and further degradation of water quality due to sediment delivery from harvested areas is not expected. The slight amounts of sediment generated from activity areas during a high runoff event would not be measurable or detectable at the analysis watershed scale and would not affect identified downstream beneficial uses.

The watershed report (2009) concluded that given implementation of erosion control features in activity areas, and observations of stream buffer effectiveness, impacts to water quality from activity disturbed ground are not expected to be a significant factor in the event of precipitation that induces overland flow in the burned watersheds. The slight amounts of sediment generated from activity areas during a high runoff event over the burned landscape would not be measurable or detectable at the analysis watershed scale and would not affect identified downstream beneficial uses, including mountain yellow-legged frog suitable and occupied habitat.

Fire-killed tree removal adjacent to riparian/perennial creeks, with implementation of RHCA equipment restriction zones, BMP's (Table C-1 in Appendix C of the Moon-

Wheeler RFEIS) and standards to meet Riparian Management Objectives, should have minimal impact on MYLF individuals or habitat, especially when compared to the effects from the wildfires themselves. It is my determination that, under all action alternatives, the Moonlight-Wheeler Project may affect individuals, but is not likely to result in a trend toward federal listing or loss of viability for the mountain yellow-legged frog.

Alternative B (No Action) - Direct/Indirect Effects.
Degraded conditions within watersheds as a result of the fires would continue. Post-fire (0-5 years) sediment loading to aquatic habitats would be higher than pre-fire levels because of the decrease in ground cover and bank stability provided by live vegetation and the resulting increase in soil movement. Sediment inputs should decrease over time as groundcover increases, vegetation re-establishes, and stream banks stabilize.

Two of the three watersheds with known MYLF populations, Lower Lone Rock Creek and West Branch Light Creek, currently exist above TOC (table 10). These two watersheds are susceptible to very high cumulative effects risk, such as erosion and large movement of sediment into streams. Lower Indian Creek watershed, suspected of having MYLF but with no detections to date, is also over TOC and at very high risk. Pierce Creek watershed exists below TOC but the risk of cumulative effects is still considered high.

Cumulative Effects: There is over 19,000 acres of private land within the analysis area. Cumulative effects from private land use (timber and gravel extraction, fire salvage harvest, livestock grazing, and urbanization) would continue to create water quality problems, including sedimentation and bank cutting.

Within the nine active grazing allotments in the fire perimeters there is expected to be minimal impacts to critical riparian areas due to the following reasons: 1) cows did not graze burned areas in 2008, the season after the wildfires, therefore riparian vegetation have had a full year of rest to resprout, 2) the increase in transitory (upland) range 2-5 years after the fires may take some grazing pressure off of the meadows and riparian areas with a flush of dryland grass/forbs that livestock may find palatable, and 3) long term recovery will be unimpeded through strict adherence to use standards which are: 20% willow use, 20% aspen use, 20% bank alteration, and 50% meadow use. Cows are removed from the pasture when any one of these triggers are reached. In addition, the Lower Lone Rock Creek watershed, which supports a well distributed population of MYLF's on Forest Service land, is scheduled to have a 1.5 mile temporary electric fence constructed in spring, 2009, before the cattle are turned out, which will prevent grazing in that reach of the watershed, further allowing riparian vegetation and streambanks to recover.

Determination: Alternative B may affect individuals, but is not likely to result in a trend toward federal listing or loss of viability for the mountain yellow-legged frog.

Bald Eagle

The bald eagle was federally listed as threatened but has now been removed from the list effective August 8, 2007 (Federal Register Vol.72, No. 130/Monday, July 9, 2007/Rules

& Regulations). It is now considered a USFS Region 5 Sensitive Species (R5 Sensitive species list, October 15, 2007). This species is found at lakes, reservoirs, rivers, offshore islands, and some rangelands and coastal wetlands in California. Bald eagles are considered a permanent resident in Plumas County.

All bald eagle nesting territories on the Plumas Forest are monitored for nesting activity three times annually. The closest known nesting area is at Antelope Lake, within the northern portion of the project area, where two active nesting pair have been present since 1995. These two nests have produced a total of 23 fledglings between 1995 and 2008 (Antelope Lake Bald Eagle Management Plan 2006 and 2007/2008 nesting records).

Bald eagles generally require large bodies of water, or free flowing rivers with abundant fish, and adjacent snags or other perches. This species swoops from hunting perches, or soaring flight, to pluck fish from water. Bald eagles are also known to scavenge dead fish, water birds, and mammals. Individual eagle's perch high in large, stoutly limbed trees, on snags or broken-topped trees, or on rocks near water and will roost communally in winter in dense, sheltered, remote conifer stands.

Bald eagles nest in large, old-growth, or dominant live trees with open branch work, especially ponderosa and sugar pine that supports some foliage available to shade the nest. Nests are usually located near a permanent water source with 87% of nest sites in California located within 1.6 km (1 mile) of water (CDFG 2006).

Post Fire Conditions

High severity wildfire results in long term harmful effects to bald eagle habitat due to reduction in existing large tree component and loss of future replacement trees that would serve as nesting structures. The Antelope Dam pair (referred to as Antelope Territory I) used a snag for a nest tree for 25 years. Thus it appears that the bald eagle can make use of the availability of large snags created by wildfire for nest structures for a period of time, but once these have fallen, it could be 160 years before a suitable replacement tree is available again.

The Antelope Complex Fire encroached into two territories within the Antelope Lake Bald Eagle Management Area (BEMA)(attachment 2). The BEMA is approximately 8,220 acres, including the 940 acre lake. Both nests were active and both had two fully feathered young in each nest during the suppression effort of the Antelope Complex. Both nests successfully fledged two young each in 2007. Approximately forty-one percent of the BEMA land acres were burned in the Moonlight and Antelope Complex fires (Table 9A). A reduction of 1,431 acres of suitable nesting habitat within the BEMA resulted from this wildfire (Table 9B)

Table 9A: Acres of Antelope Lake Bald Eagle Management Area burnt by Moonlight and Antelope Complex fires.

BEMA	Total Acres	Acres in Burn	% in burn

Antelope Lake	7,280 (land acres)	2,963	41%

The Moonlight and Antelope Complex fires resulted in an additional incremental reduction in the availability of suitable nesting habitat since 2001. Table 9B displays the cumulative reduction of available suitable nesting habitat within the BEMA (as defined in the Antelope Lake BEMA Plan; 4P, 4M, 4D, 5P, 5M, 5D). Since 2001, approximately 2,004 acres of live green suitable nesting habitat has been consumed by wildfire.

Table 9B: Changes in Nesting Habitat within Antelope BEMA resulting from Wildfire Since 2001.

SUITABLE NESTING CWHR	POST STREAM FIRE ACRES 2001	POST BOULDER FIRE ACRES 2006	POST MOONLIGHT AND ANTELOPE COMPLEX FIRES - 2007		
			Acres Reduced	Acres Gain	Total Remaining
5D	59	41	41	0	0
5M	316	272	144	0	128
5P	459	516	0	8	524
4D	94	79	79	0	0
4M	3083	2362	1285	0	1077
4P	1502	1695	25	85	1780
Total	5513 (75% of land base)*	4965 (67% of land base)	1524	+93	3509 (48% of land base)

*Baseline acres reported in January 2006 Antelope Lake BEMA Plan

The Antelope Complex burned within portions of two of the three nesting territories within the BEMA (Moonlight fire did not enter any territory). Both territory I and III nest sites are located within the area consumed by the Stream Fire in 2001. No vegetative changes in the nest stands resulted from the Antelope Complex, as a large number of the acres reported below in Table 9C were acres within the Stream Fire that re-burned with the 2007 Antelope Complex.

Table 9C: Acres within Individual Bald Eagle Territories Burnt by Antelope Complex

Territory	Mgt Zone*	Total Acres within Territory	Acres within Burn & Project Area	% in burn
Antelope I	Primary/Secondary	321	9	2.8%
Antelope III	Primary	345	153	44%

Antelope III	Secondary	296	280	95%
TOTAL		962	442	46%

*Zones described in the 2006 Antelope Lake Bald Eagle Management Plan.

Moon-Wheeler Project Effects

Action Alternatives (Alternatives A, C, D, and E) - Direct/Indirect Effects.

Table 9C indicates that approximately 442 acres assigned to an eagle territory are present within the project area. The proposed salvage/recovery project would not occur within the BEMA or within either active nesting territory at Antelope Lake (no treatment units are present in either the BEMA or Territories). There would be no habitat modification within these sites. The potential haul of salvage material could occur on roads 29N43 (FS Road 172), 28N03 and 27N42 and logging truck activity could be disruptive during the nesting season, depending on number of trucks per hour. Historically the activity on paved roads within these territories has not caused any nesting failures or territory abandonment. To limit disturbance to nesting eagles, the following standard management requirements would be followed:

1) A Limited Operating Period (LOP) would be implemented not allowing the cutting of any hazard/dead trees within Antelope III territory between January 1 and August 15 along road 28N03 and the first half mile of road 27N42.

2) No log haul is to occur on the northern portion of 27N42 to the intersection of 28N03 during this LOP. This affects essentially a ½ mile of road. This LOP forces haul south down 27N42 to Babcock Crossing.

3) No log haul is to occur on road 26N54 north through the Stream Fire to 28N03 during this LOP to protect the Antelope I nest site.

4) There is an existing well developed helicopter landing within the primary nesting zone for Antelope III nesting territory (located in Stream Fire and used for Boulder Fire rehab work). Helicopter use of this landing is problematic during the eagle nesting period as helicopter approach and take-off would be line of sight with both nest sites (Antelope I and III) and could provide a disturbance element that the birds are not used to. A LOP is required to eliminate and dissuade helicopter use of this landing during the nesting season (January 1 and August 15). Before the LOP could be lifted, both nest sites would have to be declared non-nesting, which could be determined by May 1.

Action Alternatives (Alternatives A, C, D, and E) - Cumulative Effects.

Past Fire salvage: The Stream Fire burned a total of 3,600 acres in 2001, with approximately 1,379 acres within the Antelope BEMA, including at the time both designated Antelope Lake nesting territories. Shortly after the fire, a third nesting territory was established on the south side of Antelope Lake, which later was determined to be the pair that occupied Antelope II territory. Portions of the fire were salvage logged in 2003/2004. This included removal of hazard trees, merchantable sawlogs, and subsequently reforestation in all three nesting territories.

In 2006 the Boulder Fire burned approximately 3,000 acres, of which 2,389 were located in the BEMA, including 508 acres within the Antelope II territory. Approximately 249 acres, including portions of Antelope II Territory were logged to remove hazardous trees from the recreational use areas. Since both Stream and Boulder fire/salvage has occurred, the birds at Antelope Lake have produced a total of 14 young between 2002 and 2008, including four in 2007 and three in 2008. Thus fire and salvage logging cumulatively have not resulted in a decrease in nest occupancy or production.

Thus between 2001 – 2007, approximately 6,195 land acres within the BEMA, or 85%, have experienced wildfire, including stand replacement wildfire. These fires have created conditions that, within the next 25 years, as residual, fire stressed trees die and snags fall, the reduction in the amount and distribution of available habitat supporting nest trees could increase competition between the two nesting pairs for territorial space, which could reduce the number of nesting pairs from two to one. Approximately 48% of existing land acres within the BEMA support live green habitat in size classes capable of providing nesting habitat (refer to Table 9B). Fire-killed or hazard tree removal in the proposed Moon-Wheeler Project treatment areas would not occur within the BEMA and would not exacerbate this eventual habitat loss within the BEMA.

The Antelope Complex Roadside Hazard Tree Removal (Antelope RSHTR) project was completed in 2008, with some portions implemented within the BEMA, Antelope I territory, and Antelope III territory. Table 56 indicates the maximum potential acres within each territory treated under that project. Total amount of suitable habitat within each nesting territory was not changed within either management zone as a result of hazard tree removal. (USDA 2007b, USDA 2008a).

Table 10A: Maximum potential Hazard tree removal acres in Bald Eagle Territories

TERRITORY	ROAD #	PRIMARY MGT. ZONE		SECONDARY MGT. ZONE	
		Miles	Acres	Miles	Acres
Antelope I	29N43 (FS 172)	0.75	36	0	0
Antelope III	28N03	1.0	48	0.25	12
	27N42	0.75	36	0.5	24
Total		2.5	120	0.75	36

Within the entire Antelope Lake BEMA, when combined with the one mile of roadside hazard tree removal proposed under the Moonlight and Wheeler project and the 14.5 miles treated under the Antelope RSHTR project, approximately 15.5 miles, totaling approximately 735 acres would be treated for hazard tree reduction, shown in table 10A. This is approximately 10 percent of the entire 7,280 land acres within the BEMA.

Table 10B: Maximum potential Acres of Hazard Tree Removal in Antelope Lake Bald Eagle Management Area (BEMA)

ROAD #	MILES	ACRES
From Table 10A	3.25	156
28N03	2.63	122
28N00	0.06	4
27N07C	0.35	14
26N54	0.5	24
27N60	1.5	77
27N41	2.5	121
27N41B	1.0	48
27N41D	0.25	12
27N41E	0.25	12
27N62	2.75	133
27N59	0.25	12
TOTAL	15.5	735

The BA/BE's for the Moonlight and Antelope hazard tree removal projects (USDA 2007b, USDA 2008a) concluded that the direct, indirect and cumulative effects of the action would not result in any change in population trends to meet the identified PNF LRMP goal for nesting pairs.

Approximately 630 acres of reforestation are planned to occur within the BEMA, with 25 acres located within the secondary zone of the Antelope III territory. Reforestation efforts should hasten restoration of large tree forest conditions, especially in establishment of preferred nest tree species such as ponderosa, Jeffrey and sugar pine.

Approximately 80 acres within the BEMA is private land. This land is primarily residential with 5-10 structures (cabins and trailers) and supports meadow, open shrub and open forest. This land was burned by the Antelope Complex, although no structures were lost. At this time there is no plan put forward to remove any fire-killed trees from this land.

Conclusion: The proposed action alternatives, with implementation of LOPs that have proved effective in the past for salvage and restoration projects (Stream Fire, Boulder Fire) within nesting territories at Antelope Lake, would not have any additional cumulative effects on habitat within the BEMA, individual nesting territories or cause any change in population distribution across the Plumas National Forest or the Sierra Nevada range.

Determination: It is my determination that the recovery and restoration project may affect individuals, but is not likely to result in a trend toward federal listing or loss of viability for the bald eagle.

Direct, Indirect, and Cumulative Effects of the No Action Alternative (Alternative B):
There would be no direct or indirect effects on individual bald eagles or bald eagle habitat, similar to the action alternatives, as no action would occur within the BEMA or

within territories. There would be no "out of normal" road use, thus no need for LOP's. The cumulative effects mirror those described above with the action alternatives.

Determination: The implementation of the no action alternative of the Moon-Wheeler Project would not affect individual bald eagles or bald eagle habitat.

California Spotted Owl

Post Fire Conditions

High severity wildfire results in long term harmful effects to spotted owl habitat due to reduction in existing large tree component and dense forested stand structure. In some low severity areas that support live trees and forested canopy, there could be some short term increase in snag and down wood component available for owl prey species and nesting structures. The increase in the dead wood component within high and moderately high severity areas that is adjacent to lower severity and unburned habitat could also benefit prey species that could provide increased owl foraging habitat. Wildfires the size of the Moonlight and Antelope Complex fires usually result in habitat loss and large scale openings, fragmenting suitable nesting, foraging and dispersal habitat. Conversely, the increase in edge effects between non-burned mid-late seral forest and burned early seral habitat could create an ecotone that owls may be drawn to for foraging.

Definitions of suitable habitat are derived from those listed in Verner et al (1992), SNFPA (2004), and 70 Federal Register, June 21, 2005. Based on these definitions the following CWHR types in the analysis area provide high nesting habitat capability: Sierran Mixed Conifer, White Fir, Red Fir, Ponderosa Pine, and Lodgepole Pine (5D, 5M). These CWHR types have the highest probability of providing stand structure associated with preferred nesting, roosting and foraging. Suitable foraging habitat is found in the same forest types listed above for nesting habitat (CWHR 5D, 5M) as well as 4D and 4M. Stands considered to be suitable for foraging have at least two canopy layers, dominant and co-dominant trees in the canopy averaging at least 12 inches in dbh, at least 40% canopy closure, and higher than average levels of snags and downed woody material (70 Federal Register, June 21, 2005). Although canopy cover down to 40% is suitable for foraging, they appear to be only marginally so (based on owl occurrence and productivity threshold at around 50% canopy cover, Ibid). Eastside Pine habitat east of the analysis area perimeter is not considered owl habitat on the PNF (PNF 1993, USDA Forest Service 1999, Rotta, 2000).

Table 11A displays the effects of the Moonlight and Antelope Complex fires on suitable owl habitat within the analysis area. Approximately 18,301 acres of suitable nesting habitat was rendered unsuitable and 22,536 acres of foraging habitat was rendered unsuitable on National Forest Lands as a result of the stand replacing wildfire.

Table 11A: Effects of Moonlight and Antelope Complex Fires on Spotted Owl Suitable Habitat within the Analysis Area (all acres approximate and all are National Forest)

Habitat	Pre-Fire Acres	Post Fire Acres	*Reduction in suitable habitat (%)*

Suitable Nesting Habitat (5M, 5D, 6)*	18,861	560	*97%*
Suitable Foraging Habitat (4M, 4D)*	25,622	3,086	*88%*
Total	*44,483*	*3,646*	***92%***

*CWHR tree habitat: SMC, PPN, WFR, RFR, LPN

All or a portion of twenty-five spotted owl Protected Activity Centers (PACs) are located within the perimeters of the Moonlight and Antelope Complex fires (attachment 3). Twenty PACs and their associated Home Range Core Areas (HRCAs) were 100% within the fire perimeter. Vegetation severity maps indicate that over 19,000 acres within PACs/HRCAs burned at either moderately high severity (50-75% basal area killed) or high severity (>75% basal area killed), resulting in changing suitable owl nesting/foraging habitat to unsuitable habitat. Table 11B displays acres of PAC/HRCA that burned at high/moderately high severity.

Table 11B: Spotted Owl PAC/HRCA High/Moderately High Fire Severity Analysis

PAC #	Total Acres		Total Mod-High-High Severity		PAC#	Total Acres		Total Mod-High-High Severity	
			Acres	%				Acres	%
PL005	PAC	345	260	75%	PL126	PAC	457	439	96%
	HRCA	550	407	74%		HRCA	457	380	83%
	total	895	667	75%		total	914	819	90%
PL006	PAC	316	308	98%	PL167	PAC	386	11	3%
	HRCA	498	366	74%		HRCA	687	185	27%
	total	814	675	83%		total	1,073	196	18%
PL041	PAC	360	203	56%	PL198	PAC	356	345	97%
	HRCA	797	405	51%		HRCA	861	819	95%
	total	1,157	608	53%		total	1,217	1164	96%
PL042	PAC	417	353	85%	PL199	PAC	396	209	53%
	HRCA	758	647	85%		HRCA	593	482	81%
	total	1,175	1000	85%		total	989	691	70%
PL043	PAC	316	314	99%	PL201	PAC	452	367	81%
	HRCA	613	608	99%		HRCA	743	610	82%
	total	929	922	99%		total	1,195	977	82%
PL044	PAC	387	360	93%	PL229	PAC	323	126	39%
	HRCA	662	402	61%		HRCA	909	736	81%
	total	1,049	761	73%		total	1,232	862	70%
PL071	PAC	383	209	54%	PL230	PAC	321	0	0%
	HRCA	645	308	48%		HRCA	649	29	4%
	total	1,028	516	50%		total	970	29	3%
PL073*	PAC	661	496	75%	PL253	PAC	359	225	63%
	HRCA	699	480	69%		HRCA	637	244	38%
	total	1,360	976	72%		total	996	470	47%
PL106	PAC	392	284	72%	PL262	PAC	409	409	100%
	HRCA	551	526	95%		HRCA	654	615	94%

	total	943	810	86%		total	1,063	1024	96%
PL107	PAC	290	164	57%	PL263	PAC	326	326	100%
	HRCA	755	270	36%		HRCA	398	391	98%
	total	1,045	434	42%		total	724	717	99%
PL109	PAC	336	0	0%	PL284	PAC	314	213	68%
	HRCA	761	86	11%		HRCA	680	474	70%
	total	1,097	86	8%		total	994	686	69%
PL122	PAC	322	266	83%	PL286	PAC	423	62	15%
	HRCA	800	558	70%		HRCA	660	203	31%
	total	1,122	824	73%		total	1,083	265	24%
PL123	PAC	301	300	100%	PL287	PAC	322	2	1%
	HRCA	708	584	83%		HRCA	750	538	72%
	total	1,009	885	88%		total	1,072	540	50%
PL125	PAC	499	397	80%	PL303	PAC	321	317	99%
	HRCA	508	433	85%		HRCA	391	359	92%
	total	1,007	830	82%		total	712	676	95%

*PL073 PAC boundaries were adjusted in 2002 after the Stream Fire and then adjusted again after a nest site was discovered in 2003. These adjustments resulted in the larger than normal PAC size reported above.

Vegetation severity maps were further evaluated using infra-red aerial photography flown post burn to verify the adequacy of the vegetation severity maps. Discrepancies were few, and these usually resulted in some moderate and low severity clumps that appear to have survived being lumped within high severity polygons; the post fire updated vegetation mapping and CWHR types used in this analysis reflect post-fire existing conditions (Table 3).

Little information is available to assess the effects of wildfires on spotted owls and their habitat. Recent research has revealed that spotted owls can and do utilize unlogged severely burned forests (Bond et al. 2002, Jenness et al. 2004, Clark 2007). Moderately high to high severity burn patches create abundant large snags, large downed logs, and provide conditions in which dense areas of conifer regeneration and native shrub patches can grow – all habitat components which can support small mammal prey populations important to the spotted owl. Bond (2007) summarized existing unpublished information and the little published information as part of her expert testimony during deliberations regarding Storrie Fire effects on spotted owls as well as other species. Bond asserts that a "surprising number of owl sites" continue "to be occupied and reproductively successful after fires of all severities" and that the notion that moderately and highly burned forests results in lost owl habitat "belies the preponderance of scientific data" and is therefore an incorrect claim. Basically Bond is stating that fire is a natural disturbance to which the spotted owl is adapted and it is possible that fire may enhance habitat conditions for some spotted owl prey in some instances, which could "explain the continued use of even severely burned areas by spotted owls". So Bond has presented a case for distinguishing between unburned suitable habitat and burned suitable habitat.

No published information is available that investigates whether landscapes burned with moderately high to high severity fire can maintain occupied spotted owl sites and viable populations over the long term. Bond (2007) provides information five years post-wildfire of owl use in burned forest habitat. It is unknown to what degree owls use

burned forests longer temporal scales (beyond 5, 10, 20+ years?) and larger spatial scales. It seems likely that owls may persist in newly burned areas with some remaining habitat due to site fidelity and immediate flushes of prey in response to fire (Keane, pers. comm.).

All moderately-high and high severity fire areas may have created some short term burned "suitable" habitat **as defined by Bond** (2007), especially within the ecotone between burned and unburned edges, but it is possible that owls may not be able to persist over the long-term after fires due to reductions in habitat suitability. For example, as snags fall within moderate and high severity burns, the perch component that allows for owls to carry out foraging behavior is eventually eliminated. Spotted owls are "perch & pounce" predators, selecting an elevated perch from which to locate potential prey, either by sight or sound, to carry out feeding behavior by dropping from the perch for the pounce (Verner et al, 1992, page 68). Spotted owls are also capable of "hawking" behavior, capturing flying prey, primarily insects and birds. It is suspected, based on longevity of snags and the growth potential of conifers competing through brush created by wildfire, that there would be a period of time where this burned habitat would not support much of the habitat parameters described by Bond (2007) as providing owl habitat. Assuming most all fire-killed snags fall by year 30 (see Table 4.1 in USDA Forest Service 2008a) and conifer habitat (plantations) would take approximately 60 years to achieve CWHR 4P stand conditions (11-24 inches dbh trees, 20-39% canopy cover) which is not considered suitable owl habitat, it is logical that high and moderate high severity burns create long-term unsuitable owl habitat for a number of years because the snag and tree perches (as well as potential nest structures) are not present. The 50 year timeframe is based on the Lights Creek Burn plantation and Big Burn plantation located in Transition Zone of Mt. Hough RD, growing on decomposed granitic and volcanic soils similar to the project area.

Management strategies provided in the LRMP to maintain viable populations of spotted owls are based on what is recognized as suitable for this species in the CASPO Report (Verner, et al 1992), the 2004 SNFPA FEIS and Vol 71 Federal Register of May 24, 2006. These strategies are designed to identify suitable owl habitat and protect this owl habitat from being destroyed by stand-replacing wildfire. Moderately-high to high severity burned forest habitat, in which CWHR 4M, 4D, 5M, and 5D forested stands converted to CWHR 1 and 2 deforested stands, primarily within the Montane Chaparral type, results in both short and long-term unsuitable habitat conditions for the spotted owl and these regions are not expected to contribute to species viability.

Because of the unknowns and uncertainties associated with both the short and long-term responses of owls affected by wildfire, owl responses should be assessed post-fire and then monitored over time to determine if post-fire landscapes provide habitat used by spotted owls. In 2008 the first year of spotted owl surveys were conducted to protocol (USDA 1993) within the fire perimeter and within a 1 mile unburned buffer area surrounding the perimeter by Plumas Lassen Administrative Study owl crews. A primary objective of these surveys is to verify owl presence or absence, help determine any activity centers, and modify PAC boundaries or add new PACs to the network based on any results identifying activity centers. In 2009 these surveys will be repeated again. As

well, longer term monitoring is being considered to gain further insight into the distribution and abundance of owls within and adjacent to the fire area over the next 5-10 years.

The 2008 surveys documented a single confirmed pair of CSOs (non-breeding) within the analysis area (PL107 – Freds Creek Pac), with the female from this pair being the only female detected. There were 10 single detections of male CSOs across the burned area. In each of these ten cases surveyors were not able to locate the birds at nests or roosts on follow-up status surveys. Each of these ten locations occurred primarily in the middle of the night when birds are out foraging and none of the detections occurred within 1/2-mile of each other as required to classify these individuals as territorial birds under currently accepted protocols. Within the unburned 1-mile buffer area surrounding the burned area there were documented 5 confirmed pairs, 1 unconfirmed pair, 1 territorial male single, and 6 single detections (4 males, 2 sex unknown). Thus, in the immediate unburned buffer area territorial sites were observed whereas only one confirmed territorial pair was documented within the burned area.

PAC History

Historical information for PACs impacted by the Moonlight and Antelope Complex fires goes back in some cases to 1987. Surveys for spotted owl were conducted within the project area for various projects between 2002 and 2006 (Sloat 2002, GANDA 2003, Holmes Terra-Mar 2006). Table 12 provides information on detection and occupancy data for the twenty-five PACs impacted by the Moonlight and Antelope Complex fires. No surveys occurred in 2007.

Table 12. Historical Spotted Owl Detections/Occupancy Information for PACs impacted by the Moonlight and Antelope Complex fires.

PAC #	Best Detection and Date	Most Recent Detection prior to 2006	2006 Status	2008 Status (post-fire)
PL005	Nesting 90 (2)	Pair 2005	Pair	no detections
PL006	Pair 90, 91, 03, 05, 06	Pair 2005	Pair	no detections
PL041	Nesting 88 (2)	presence 2001	no detections	no detections
PL042	presence 80, 87, 05, 06	Female 2005	Female presence	no detections
PL043	Nesting 90	Pair 2003	Male presence	no detections
PL044	Pair 87, 89, 06	Female 2003	Pair	no detections
PL071	Nesting 90 (2)	Nesting 90 (2)	no detections	no detections
PL073	Nesting 03 (2), 05 (1)	Nesting 2005 (1)	Male presence	no detections
PL106	presence 89, 03, 05	Male 2005	no detections	no detections
PL107	Pair 2003	Pair 2003	Female presence	Pair
PL122	Nesting 92 (1),01(1),02(1),05(2)	Nesting 2005 (2)	Pair	no detections
PL123	Nesting 90 (1)	Female 2005	Pair	no detections
PL125	Nesting 89 (1), 05	Nesting 2005	Male presence	no detections
PL126	Nesting 92 (1)	Female 2005	Pair	no detections
PL167	Nesting 90 (1), 92 (1)	Male 2005	Male presence	no detections
PL198	presence 91, 01	presence 2001	not surveyed	no detections
PL199	Nesting 94 (0)	Nesting 94 (0)	no detections	no detections

PL201	presence 91, 03, 05	Male 2005	no detections	no detections
PL229	Nesting 92 (3)	Female 2005	Male presence	Male presence
PL253	Pair 06	presence 92	Pair	no detections
PL262	Nesting 88 (1), 89(1), 02 (1)	Male 2005	Pair	Male presence
PL263	Nesting 92 (3)	Pair 2005	Male presence	no detections
PL284	Nesting 05 (1)	Nesting 2005 (1)	Pair	Male presence
PL286	Nesting 05 (2)	Nesting 2005 (2)	no detections	no detections
PL303	Pair 93	Pair 93	no detections	no detections

Areas of Concern.

General Technical Report PSW-GTR-133, "The California Spotted Owl: A Technical Assessment of its Current Status, July 1992 (referred to as Verner et al, 1992), provided five conditions where there would be concern for the integrity of the California Spotted owls' range in the Sierra Nevada: (1) bottlenecks in the distribution of habitat or owl populations; (2) gaps in the known distribution of owls; (3) locally isolated populations; (4) highly fragmented habitat; and (5) areas of low crude density of spotted owls. Where these conditions exist, they currently limit the owl population and if conditions were exacerbated, there could be a critical concern regarding viability of the population. These conditions may be caused solely or jointly by fire, land-ownership patterns, natural or human caused fragmentation of suitable habitat, and by natural geographic features that control vegetation patterns. These areas have been identified as Areas of Concern (AOC) (Verner et al, 1992, pages 45 -48).

AOC 1 and 2 occur in Lassen and Plumas County and bump up against the Plumas National Forest, including the portion of the forest where the Moonlight Fire burned in September, 2007. Specifically, what makes AOC 1 a concern is the discontinuous, naturally fragmented and poor quality habitat due to drier conditions and lava based soils, resulting in fragmentation that decreases the density of owl pairs, makes successful dispersal more difficult, and reduces the likelihood of quick replacement of owls in vacated habitat (Ibid). AOC 1 is not reflective of conditions within the area impacted by the Moonlight or Antelope Complex fires.

AOC 2 is located in northern Plumas County and is a concern because of a gap in known distribution, mainly on private lands, which extends east-west in a band almost fully across the width of the owls range (Ibid). If few birds and little habitat exist in this area, north-south dispersal could be impeded. The Moonlight Fire, in relationship to this AOC, has potentially extended this east-west band eastward approximately 5-10 miles, creating a wide swath of unsuitable habitat that further impedes north-south dispersal. This new swath extends from the approximate eastern end of the delineated AOC 2 boundary across the northern Plumas County boundary toward Red Rock Lookout. Beyond Red Rock is open red fir and mixed conifer transitioning to eastside pine and then meeting the escarpment at Thompson Peak. Essentially the Moonlight Fire created a connection between AOC 2 and eastside pine/great basin influence.

The Moonlight Fire has created what appears to be a very large gap in the distribution of owls and owl habitat similar to that described for AOC 2. Since the Moonlight Fire meets

the Antelope Complex, the wildfires have contributed cumulatively to a potential gap in owl distribution.

Corridors of suitable habitat that provide linkages for owl dispersal and movements across the Forest are still available on the Westside of the PNF. Narrow corridors of dispersal habitat are still potentially available within the project area along Middle and Indian Creeks. These areas may still allow for owl dispersal in a north/south direction, linking with Boulder Creek and connecting with occupied habitat on the Lassen NF. But the combination of the two wildfires on Mt. Hough Ranger District in 2007 has created a potential dispersal bottleneck in northeastern Plumas County.

PAC and SOHA Evaluation Process:

The existing amount of suitable nesting and foraging habitat available in each PAC impacted by the Moonlight and Antelope Complex fires is presented in Table 13A.

Table 13A: Existing Amount of Suitable Owl Habitat Present for each PAC/HRCA post Moonlight and Antelope Complex fires.^

PAC/ HRCA #	PAC Suitable Acres		HRCA Suitable Acres		PAC/ HRCA #	PAC Suitable Acres		HRCA Suitable Acres	
	Nesting (5M,5D)	Foraging (4M,4D)	Nesting (5M,5D)	Foraging (4M,4D)		Nesting (5M,5D)	Foraging (4M,4D)	Nesting (5M,5D)	Foraging (4M,4D)
PL005	28	27	0	33	PL126	0		29	0
PL006	0	4	0	20	PL167*	179	138	102	266
PL041	3	47	93	79	PL198	0	10	2	14
PL042	0	16	0	15	PL199	0	22	0	12
PL043	0	0	0	5	PL201	0	26	1	51
PL044	0	8	0	105	PL229	0	32	0	16
PL071	5	49	0	221	PL230*	144	125	186	323
PL073	0	1	22	14	PL253	0	0	39	89
PL106	0	24	0	0	PL262	0	0	0	25
PL107	0	0	0	124	PL263	0	0	0	0
PL109*	134	175	79	437	PL284	0	0	0	38
PL122	0	2	33	120	PL286*	93	221	137	272
PL123	0	1	0	57	PL287*	239	44	110	15
PL125	0	43	0	2	PL303	0	0	0	1

^ based on post-fire vegetation mapping, crosswalked to CWHR
* PACs not affected by fire (PL109, PL230, PL287) or minimally affected by fire (PL167 – 3% burned at high severity, PL286 -15% burned at high severity. Both with 300+ existing suitable acres). These PACs will remain as PACs and are not carried forward in PAC evaluation process.

Direction for evaluating a PAC for retention or removal after a stand replacing event is found on page 37 of the SNFPA 2004 ROD. The process is as follows;

1. Evaluate habitat conditions within a 1.5-mile radius around existing 300 acre PACs.

a. If opportunities exist (i.e. suitable habitat remains within a 1.5 mile radius) for re-mapping the PAC, re-map the PAC at a minimum of 300 acres.

Based on SNFPA 2004, as well as GTR-133 (Verner et al 1992), the PAC is 300 acres of the best possible owl habitat available, blocked up into as compact a unit as possible around an owl activity center (nest site or best roost or repeated daytime detections). The existing PAC number could be retained or a new PAC number could be established.

b. If opportunities do not exist (i.e. no suitable habitat remains within a 1.5 mile radius, or 300 acres of contiguous suitable not present, or suitable habitat scattered across the area and not arranged to logically create a compact unit, or an adjacent existing PAC already exists) for re-mapping, the PAC may be removed from the network. PAC may be removed after rationale has been documented for removal without the need to conduct owl surveys.

This process was conducted for the PACs within the Moonlight and Antelope Complex fires. Vegetation severity maps and post fire infra-red aerial photos were initially used to evaluate post-fire habitat conditions. Since this preliminary evaluation, the new post-fire vegetation map, crosswalked to CWHR, has been used to provide additional, more refined habitat availability analysis. The 1.5 mile radius circles for each PAC can be found at attachment 4.

Table 13B: Habitat Analysis within 1.5 mile radius of Activity Centers impacted by the Moonlight and Antelope Complex fires.

	Existing Suitable Habitat within 1.5 mile radius (acres)*			Suitable Habitat Block Size within 1.5 mile radius			Suitable acres within other PAC/HRCA	Available suitable acres
PAC #	4M4D	5M5D	Total	>60 ac	<60 ac >1 ac	300+ ac		
PL005	133	145	278	1	11	0	PL041 = 74 LS009 = 73	131
PL006	522	153	676	1	26	1 (482 ac)	PL005 = 88 PL044 = 89 LS009 = 522	43
PL041	206	63	269	1	16	0	PL042 = 28	241
PL042	14	0	14	1	9	0	0	178
PL043	14	0	14	0	1	0	0	14
PL044	386	57	443	1 (297ac)	11	0	PL006 = 9 PL286 = 113 LS027 = 196	125
PL071	669	63	731	2 (269 ac)	18	0	PL109 = 53 PL287 = 35	644
PL073	362	588	950	1	9	1 (893 ac)	PL106 = 24 PL167 = 353 PL287 = 84	488
PL106	116	0	116	0	10	0	PL073 = 12 PL201 = 59	44
PL107	415	8	423	1	13	1 (323 ac)	PL109 = 82	341

PL122	115	35	149	0	9	0	0	149
PL123	285	13	297	0	19	0	PL107 = 9 PL284 = 25	263
PL125	53	7	60	0	3	0	PL126 = 7	53
PL126	164	86	250	0	12	0	PL073 = 22 PL125 = 36	192
PL198	139	20	159	1	12	0	PL201 = 23	136
PL199	183	58	241	1	6	0	PL043 = 3 PL262 = 25 PL284 = 28 PL303 = 1	184
PL201	272	138	410	1 (234 ac)	13	0	PL167 = 68 PL198 = 19	323
PL229	92	0	92	0	7	0	PL043 = 3 PL284 = 10	80
PL253	212	55	267	1	6	0	PL122 = 148	119
PL262	69	0	69	0	3	0	PL043 = 3 PL199 = 3	64
PL263	0	0	0	0		0	0	0
PL284	181	0	181	0	10	0	PL123 = 46 PL199 = 31 PL303 = 1	102
PL303	276	58	334	2	10	0	PL041 = 78 PL042 = 16 PL199 =17 PL262 = 18 PL284 = 9	197

* Forest Service acres only

Based on this analysis, the following 20 PACs will be removed from the PNF PAC network: PL005, PL006, PL041, PL042, PL043, PL044, PL106, PL122, PL123, PL125, PL126, PL198, PL199, PL201, PL229, PL253, PL262, PL263, PL284, PL303. None of these areas have any of the following: 1) enough suitable habitat to create a 300 acre PAC in a compact unit that is not already assigned to another PAC, 2) enough contiguous habitat in large (greater than 60 acre) blocks to make up 300 acres, and 3) an identified occupied activity center within the 1.5 mile radius circle that does not already have an assigned PAC number and boundary delineation. In addition, as stated earlier, survey results from 2008 did not detect any resident single owls or pairs in the territories to be removed.

As Table 13B shows, PL071, PL073, and PL201 have over 300 acres of available suitable acres within the 1.5 mile evaluation circles:

PL071 - There are two large suitable acre blocks (269 acres and 147 acres) to the south of this PAC and outside the fire boundary. These two blocks are in very close proximity to each other, separated by a strip of unsuitable habitat comprised of CHWR WFR4P and WFR3S approximately 100-250 meters wide by 500 meters

long. These two blocks represents the best possible habitat available. In accordance with the SNFPA 2004 ROD for re-mapping a PAC after a stand-replacing event, this block of habitat will receive tentative PAC status. PAC boundaries may be modified based on future owl survey results, which includes the Plumas Lassen Administrative Study (PLAS) owl crew efforts currently being conducted within and adjacent to the analysis area. Survey results from 2008 did not detect any owls within this new PAC boundary.

PL073 - The largest suitable habitat block for this PAC is 893 acres, 464 acres of which falls within existing PACs/HRCAs (PL167, PL287). Therefore, for PL073, the largest available suitable habitat block is 429 acres. This block is located outside the fire perimeter and is adjacent to PL167, PL287, and PL072. This block represents the best possible habitat available. In accordance with the SNFPA 2004 ROD for re-mapping a PAC after a stand-replacing event, this block of habitat will receive tentative PAC status. PAC boundaries may be modified based on future owl surveys results, which includes the PLAS owl crew efforts currently being conducted within and adjacent to the analysis area. Survey results from 2008 did not detect any owls within this new PAC boundary.

PL201 – Although Table 13b indicates there is 323 acres of available suitable habitat within the 1.5 mile circle, much of this area is composed of numerous small blocks of fragmented habitat. There is one large block of 234 acres, 63 acres of which fall within another PAC (PL167). Therefore, only a 171 acre block of suitable habitat is actually available for re-mapping purposes. This is not a large enough area to designate a PAC, therefore PL201 is deemed unsuitable and have been removed from the Plumas NF PAC network. Survey results from 2008 did not detect any owls within this new PAC boundary.

In summary, of the twenty-five spotted owl PACs affected by the Moonlight and Antelope Complex fires, twenty PACs have been lost due to high severity wildfire effects and will be removed from the PNF PAC network. PL071 and PL073 were severely affected by the fires and have been tentatively re-mapped to the best available suitable acre blocks (greater than 300+ acres), which happen to fall outside of the analysis area. These two PACs may be modified in the future, based on owl survey results, to reflect more defined activity center locations. As stated earlier, survey results in 2008 determined pair status in PL107. This PAC has been retained and tentatively re-mapped to the best available suitable acres around this new activity center location.

Direction for evaluating Spotted Owl Habitat Areas (SOHAs) for retention after a stand replacing event is found in Appendix Q, HFQLG EIS (1999) and further clarified in the HFQLG / SNFPA Implementation Consistency Crosswalk (revised 12/11/2007). The process is as follows:

1. If SOHAs have large scale mortality, follow direction under Appendix Q, HFQLG EIS, to determine if a SOHA should be retained or removed from the network. Follow App. Q evaluation and undesignate areas that are rendered unsuitable. Salvage is acceptable in those areas, but not remainder of SOHA. If

the SOHA is determined to be 100% unsuitable habitat, then salvage may occur in entire SOHA.

2. If a SOHA or a portion thereof, is rendered unsuitable by a catastrophic event such as wildfire, remaining suitable habitat within the SOHA shall be maintained as base habitat. However there is no requirement that these SOHA's be replaced or that additional habitat is added to SOHA's.

There are five 1000-acre based SOHAs within the Moon-Wheeler Analysis Area (attachment 5). Using the post-fire habitat conditions represented by the updated CWHR vegetation map, each SOHA was evaluated to determine if it should be retained or removed from the network.

Table 14: Habitat Analysis for the five SOHAs within the Moon-Wheeler Analysis Area.

SOHA #	SOHA Acres	Existing Suitable Habitat to be Maintained as Base Habitat			% of SOHA unsuitable
		4M4D	5M5D	Total	
S1	1083	0	0	0	100%
S2	1068	108	0	108	90%
S3	1130	87	41	128	89%
T2	1223	52	416	467	38%
T3	1127	43	0	43	96%

Based on the evaluation summarized in Table 14, SOHA S1 has been rendered unsuitable by the wildfires. As a result, SOHA S1 has been removed from the Plumas NF network. SOHA's S2, S3, T2, and T3 experienced severe fire effects as well but some suitable habitat still exists within each SOHA's boundary. Following the direction stated in Appendix Q of the HFQLG EIS, salvage is acceptable in areas rendered unsuitable while the remaining suitable habitat within each SOHA (746 total acres) will be maintained as base habitat.

California Spotted Owl as Management Indicator Species:

The California spotted owl is a Region 5 Management Indicator Species (MIS) on the Plumas National Forest (USDA 2007b). The habitat and population status and trend data for the spotted owl is summarized below. This information is drawn from the detailed information on habitat and population trends in the Sierra Nevada MIS Report (USDA 2008b), which is hereby incorporated by reference.

Bioregional Habitat Status and Trend: There are currently 994,000 acres of late seral closed canopy coniferous forest (ponderosa pine, Sierran mixed conifer, white fir, and red fir) habitat on National Forest System lands in the Sierra Nevada (USDA Forest Service 2008b). The trend is slightly increasing (from 7% to 9% within the last decade on National Forest System lands).

Habitat Status and Trend on PNF. Impacts to spotted owl nesting habitat can be related to the amount of CHWR size classes 5M, 5D and 6 that have been tracked across the HFQLG Pilot Project, which includes the Plumas, Lassen and Sierraville District of the Tahoe (HFQLG EIS, pg. 2-8, HFQLG 2005 Monitoring Summary Report (3/3/2006). Reductions are documented and a cumulative total is tracked to make sure that no greater than a 10% reduction occurs over the life of the Pilot Project (1999 to 2009). There are currently 186,394 acres classified as 5M, 5D and 6 in the pilot project area. As of January 28, 2008, habitat suitability on 3,296 acres has or will have been reduced as a result of implementing HFQLG Projects. These acres total approximately 1.8% of the acres in 5M, 5D and 6 within the Pilot Project. These acres have been reduced to either CWHR 5P in DFPZ's or CWHR 1 and 2 in group selections.

Most of the projects affecting the spotted owl on the Plumas NF have been HFQLG projects, so the amount of 5M, 5D, and 6 affected by HFQLG appears to be a good indicator of habitat trend. The 1.8% of 5M, 5D and 6 habitat affected to date is relatively low compared to the overall amount of suitable habitat available across the pilot area. Thus across the HFQLG area there has been a slight decrease in nesting/roosting habitat since 2000.

In contrast to these HFQLG Projects, high/moderate severity burns within the pilot project area since 1999 has resulted in a reduction in old forest habitat (5M, 5D,and 6) of 25,685, or a fourteen percent loss in habitat. This is about 7-8 times more habitat loss than the reductions that have occurred with fuel reduction/group selection projects. The Moonlight and Antelope Complex fires resulted in a decrease of 18,301 acres of 5M, 5D (Table 11A) as well as the loss of 20 spotted owl PACs and associated HRCAs.

Population Status and Trend. The Draft 2006 Meta analysis "Demography of the California Spotted Owl in the Sierra Nevada: Report to the US Fish and Wildlife Service on the January 2006 Meta-Analysis" (referred to as Blakesley et al 2006) is the most current and comprehensive summary of population trends for the California spotted owl. It has been prepared to help in the decision process for the potential listing of the California spotted owl. The 2006 meta-analysis was similar to the 2001 meta-analysis (Franklin et al. (2004) but included 5 years of additional data (2001-2005), excluded the San Bernardino study, and included a population viability analysis.

This 2006 meta-analysis indicated that (1) there is no strong evidence for decreasing population trends from any of the demographic studies. In general lambda (λ), the finite rate of population change, where $\lambda < 1$ indicates a declining population, was not different from that of a stationary population; (2) only the Lassen population decreased significantly based on the 95% confidence interval with steady decreases from 1995-1998, and 2002-2004, suggesting the Lassen owl population may be declining; (3) the population viability analysis (PVA) indicated two of the four study areas (Lassen and Sierra) are likely to experience population declines within 7 years and very unlikely to experience population increases under current population trends, but there was great uncertainty in the PVA analyses for time intervals of >10 years; (4) positive trend in adult survival in all studies and estimates of apparent survival increased with time; (5)

spotted owl management needs to maintain a high survival rate of territorial owls in order to maintain spotted owl populations, but that management directed at increasing reproductive output and subsequent recruitment may be the most successful way to maintain or increase spotted owl populations in the Sierra Nevada, as long as these actions do not decrease adult survival. Population growth rate (lambda) can be viewed as the sum of apparent survival probability and the per capita recruitment rate. The study indicates high adult survival and that the majority of immigrating owls onto the study areas considered in the meta-analysis "were likely natal dispersers rather than breeding dispersers".

In responding to the latest listing petition, the USFWS conducted a comprehensive study of the California spotted owl populations. It assessed the best scientific and commercial information available; reviewed comments and information received during two public-comment periods; and consulted with recognized spotted-owl experts and Federal and state resource agencies, including an interagency Science Team. On May 15, 2006 the USFWS concluded that the California spotted owl should not be listed as a threatened or endangered species under the ESA (Federal Register 50 CFR 17, Volume 71, Number 100, May 24, 2006). The USFWS considered the information presented in the 2006 meta-analysis and found that populations of California spotted owl in the Sierras showed little evidence of a decline, and concluded that the owls' status in the Sierra Nevada, which includes Plumas County and the Plumas National Forest, is not deteriorating as is evidenced by the increasing adult survival and stationary trend of the populations.

Bio-regional monitoring (including the Plumas Lassen Administrative Study (PLAS) spotted owl module, and the latest U.S. Fish & Wildlife Service listing determination indicates a stable to slightly upward population trend for the California spotted owl (Federal Register 50 CFR 17, Volume 71, Number 100, May 24, 2006). The latest PLAS annual Report (2008) continues to warn of a declining population trend on the Lassen NF identified in the meta-analysis with support of an apparent decline in spotted owl numbers between 2005-2007. The PLAS Report also indicates that the baseline information on spotted owl abundance and distribution from the Plumas NF study sites suggests that numbers of territorial spotted owls and sites have been similar on the Plumas between 2004 -2007 (California Spotted Owl Module: 2007 Annual Report, 10 January 2008); in other words, no apparent decline.

The Sierra Nevada MIS Report (USDA Forest Service 2008b) provides background information on the status, population estimates and trends of spotted owl populations located within the Sierra Nevada Range, which includes the Plumas NF. California spotted owl has been monitored in California and throughout the Sierra Nevada as part of general surveys, monitoring of nests and territorial birds, and demography studies (Verner et al. 1992, USDA Forest Service 2001, 2004, USFWS 2006, Sierra Nevada Research Center 2007). Current data at the rangewide, California, and Sierra Nevada scales indicate that, although there may be localized declines in the rate of population change, the distribution of California spotted owl populations in the Sierra Nevada is stable.

The Forest calculated occupancy rate information from 1991 data on the 54 Spotted Owl Habitat Areas (SOHAs) being monitored under the forest plan at that time. The 1991 occupancy rates showed that owl pairs at the time occupied 74% of habitat areas, singles occupied 22%, and that 4% of the sites had no owls or were unoccupied. Prior to the summer of 2007, the spotted owl status on the Plumas National Forest consisted of 296 PACs. Based on monitoring data collected on the Forest, these PACs contain a range of 135 to 163 owl pairs, and 93 to 142 single owls (USDA 2006b). Occupancy rates of owl sites indicate a stable trend on the forest based on Plumas NF data from 1991 and PLAS data from 2005. This spotted owl population is well above the estimated number of owl pairs projected by the Forest LRMP during the 1st and 2nd decade (Chapter 4, LRMP, page 4-14).

Moon-Wheeler Project Effects to the Spotted Owl

Definitions of suitable habitat are derived from those listed in Verner et al (1992), SNFPA (2004), and 70 Federal Register, June 21, 2005. Based on these definitions the following CWHR types in the analysis area provide high nesting habitat capability: Sierran Mixed Conifer, White Fir, Red Fir, Ponderosa Pine, and Lodgepole Pine (5D, 5M). These CWHR types have the highest probability of providing stand structure associated with preferred nesting, roosting and foraging.

Table 11A indicates that within the analysis area, there is 3,646 Forest Service acres of CWHR types present having habitat attributes similar to those supporting owl habitat (560 acres CWHR 5M/5D, and 3,086 acres 4M/4D). These habitat parcels, because they are either not burned or burned at low intensity, will not be treated for fire-killed tree removal and will continue to support the designated CWHR type. There would be no fire-killed tree removal from CWHR types still classified as 4M, 4D, 5M, 5D.

Alternative A - Direct/Indirect Effects.

Fire-killed or hazard tree removal would occur on 14,755 acres using helicopter, skyline, and tractor logging systems. Two PACs within the PNF PAC network would be minimally treated (8 acres total) for roadside hazard tree removal only under these actions. Outside of PACs, there would be no removal of fire-killed trees from non-burned parcels or areas burnt at low severity (less than 50 percent basal area mortality). No fire-killed tree removal would occur within currently suitable spotted owl habitat (as defined on pg. 45). Removal of fire-killed or roadside hazard trees in non-suitable habitat would not change the existing condition of the amount of suitable habitat. Removal of dead trees that could be available for additional prey species if left on site, may incrementally impose a decrease in habitat suitability for spotted owls from pre-treatment conditions. Narrow corridors of dispersal (live-green forested) habitat within the analysis area, would not be treated for fire-killed or roadside hazard tree removal.

Table 15. Accounting of acres under alternative A treated for fire-killed or roadside hazard tree removal in areas formerly known as spotted owl PACs.

PAC #	Former Land Type	Alt A Acres	PAC #	Former Land Type	Alt A Acres	PAC #	Former Land Type	Alt A Acres	PAC #	Former Land Type	ALT A Acres
PL005	PAC	131	PL044	PAC	297	PL126	PAC	304	PL253	PAC	142

	HRCA	211		HRCA	221		HRCA	113		HRCA	44
	TOTAL	343		TOTAL	518		TOTAL	417		TOTAL	185
PL006	PAC	252	PL106	PAC	180	PL198	PAC	0	PL262	PAC	277
	HRCA	175		HRCA	5		HRCA	0		HRCA	310
	TOTAL	427		TOTAL	186		TOTAL	0		TOTAL	587
PL041	PAC	81	PL122	PAC	134	PL199	PAC	75	PL263	PAC	215
	HRCA	73		HRCA	258		HRCA	454		HRCA	306
	TOTAL	154		TOTAL	391		TOTAL	529		TOTAL	522
PL042	PAC	293	PL123	PAC	169	PL201	PAC	59	PL284	PAC	141
	HRCA	149		HRCA	289		HRCA	169		HRCA	341
	TOTAL	442		TOTAL	457		TOTAL	228		TOTAL	482
PL043	PAC	260	PL125	PAC	186	PL229	PAC	23	PL303	PAC	0
	HRCA	440		HRCA	215		HRCA	549		HRCA	9
	TOTAL	701		TOTAL	401		TOTAL	572		TOTAL	9

Under alternative A approximately 3,218 acres of fire-killed or hazard tree removal would occur in areas formerly known as PACs and approximately 4,331 acres would occur in what was formerly designated as HRCAs. This is displayed in table 15. This combined 7,550 acres proposed for treatment is not suitable owl habitat due to the effects from moderately high and high severity fire, and the PAC numbers listed in table 15 have been removed from the PNF spotted owl network of PACs.

Table 16 shows treatments that are proposed under alternative A that fall within the eight remaining PACs and associated HRCAs in the analysis area. The acres within PACs PL071 (1 acre) and PL286 (7 acres) are proposed for roadside hazard removal treatment only. All acres summarized in table 59 reflect areas where fire killed trees or roadside hazard trees are planned for removal. No suitable owl habitat (CWHR 4M, 4D, 5M, 5D) would be entered or altered by the proposed actions.

Table 16. Proposed treatment acres under all action alternatives in remaining PACs and HRCAs within analysis area.

PAC #		ALT A	ALT C	ALT D ALT E	PAC #		ALT A	ALT C	ALT D ALT E
PL071	PAC	1	1	1	PL167	PAC	0	0	0
	HRCA	19	19	19		HRCA	132	5	0
	TOTAL	20	20	20		TOTAL	132	5	0
PL073	PAC	0	0	0	PL230	PAC	0	0	0
	HRCA	248	36	5		HRCA	0	0	0
	TOTAL	248	36	5		TOTAL	0	0	0
PL107	PAC	0	0	0	PL286	PAC	7	7	7
	HRCA	62	2	2		HRCA	135	52	13
	TOTAL	62	2	2		TOTAL	142	59	20
PL109	PAC	0	0	0	PL287	PAC	0	0	0
	HRCA	41	41	41		HRCA	315	259	111
	TOTAL	41	41	41		TOTAL	315	259	111

There would be no new system road construction so no long-term increases in human activities are expected as a result of this action. There would be approximately 19 miles of temporary road constructed to accommodate logging systems; these would be

decommissioned upon completion of the project. Road density would remain the same within the analysis area as pre-fire conditions, which is 2.62 miles of open road/square mile.

Cumulative effects common to all alternatives:

(Please see discussion on pg. 23 - General cumulative effects common to all action alternatives)

The Stream fire burned a total of 3,600 acres in 2001. Prior to the burn the Stream fire area supported 2,428 acres of suitable spotted owl nesting and foraging habitat; after the fire there was 129 acres of suitable habitat located across the fire landscape in five isolated stands. Three spotted owl PACS were impacted by the Stream fire: PL073, PL106 and PL126. In 2002, PACs and HRCAs for these three PACs impacted by fire were re-drawn. Re-drawing these PACs was based on availability of suitable habitat around the fire perimeters and 2002 owl detections (BA/BE Stream Fire Restoration Project, January 21, 2003). Thus there was no net loss of PACs from the PNF owl network. As described earlier, PL073 has been re-mapped and PL106 and PL126 have now been rendered unsuitable as PACs as the result of the Moonlight and Antelope Complex fires.

In 2006 the Hungry fire burned 547 acres within the Middle Creek drainage; approximately 325 acres burned at low severity, 113 acres of moderate severity and 109 acres of high severity. A total of 170 acres of suitable habitat (5M and 4M) was rendered unsuitable habitat as a result of the fire. The Hungry fire burned within PAC PL167 and its associated HRCA. Approximately 114 acres of the 386 acre PAC (30 percent) was burnt, the entire 114 acres was composed of CWHR 5M. Approximately 25 acres burnt at high/moderate severity, and 89 acres at low severity. The high severity was stand replacing and converted the existing habitat to CWHR type 1 and 2, while the low severity did not change the CWHR type. Therefore 25 acres were changed from CWHR 5M to CWHR 2 and 89 acres did not change. Approximately 47 acres of the 686 acre HRCA (7 percent) burnt, with 33 acres at high/moderate severity, and 14 acres burnt at low severity; the high severity was stand replacement and converted the existing habitat to CWHR type 1 and 2, while the low severity did not change the CWHR type.

PL167 was re-configured based on fire severity and field reconnaissance. Habitat created unsuitable in the PAC and HRCA was excluded from these areas. In addition, habitat that was isolated as a result of the fire was also removed. Approximately 7 acres of HRCA was excluded. After reconfiguration, PAC PL167 contains over 300 acres of the best available habitat. This habitat contains the known nest stand which is located at the south end of the PAC along Middle Creek. Overall, the PAC/HRCA contains 1,007 acres (Hung ry Fire Salvage Project BA/BE, 3-06-07).

In 2007 the Hungry fire salvage project removed fire-killed trees from 75 acres. All 75 acres were high burn severity acres and were analyzed as 75 acres of CWHR 1 and 2 (early seral grass/forb/brush). No suitable owl habitat was impacted by this project, and no fire-killed tree removal occurred within the PAC. The Hungry Fire Salvage Project did not result in any additional unsuitable spotted owl habitat.

Two roadside safety and hazard tree removal projects (Antelope Complex on the Mt. Hough Ranger District and Dry Flat on the Beckwourth Ranger District) were implemented in 2008. These two projects removed hazard trees from approximately 3,330 acres. The Antelope Complex project was the only project of these two to enter and treat an existing HRCA for roadside hazard tree removal. This occurred in the HRCA for PL167 and approximately 13 acres were treated.

Barred owls (*Strix varia*) continue to have an apparent increase in distribution and numbers in the northern Sierra Nevada and may become an increasing risk factor to spotted owl (California Spotted Owl Module: 2007 Annual Report, 10 January 2008).The Plumas Lassen Administrative Study synthesis of barred-sparred owl records through 2007 indicates that there are a minimum of 41 individual site records across the northern Sierra Nevada. None of these detections have been located within either the Antelope Complex Fire or Moonlight Fire areas. It is uncertain as to what the long term impacts of wildfire and forest succession may have on barred owl abundance and distribution; in the short-term, suitable nesting and foraging habitat for this species, as inferred by barred owl habitat use during detections on the PNF, has been rendered unsuitable by wildfire.

Alternative A – Cumulative Effects.
Table 17 shows all acres of proposed or current treatments from fire-killed or hazard tree removal actions within the analysis area for alternative A. Approximately 29,980 acres on public and private land (35 percent) is proposed for fire-killed or hazard tree removal within the analysis area under alternative A. On public land, approximately 18,526 acres of fire-killed or hazard tree removal would occur under alternative A. This is 27 percent of the 68,408 public land acres within the analysis area. Thus, under this alternative, approximately 49,882 acres (73%) of the fire land base located on public land would not be treated for fire-killed or hazard tree removal. This land base would be supporting various densities of fire-killed trees with the overall snag density (15”dbh or greater) estimated at 11.7 snags/acre.. Fire-killed tree removal would not result in any additional unsuitable spotted owl habitat above what was changed due to wildfire.

Table 17: Acres of proposed and current post-fire treatments in the wildlife analysis area – Alternatives A.

	Alt A acres proposed for fire-killed/hazard tree removal	**% of analysis area**	**% on public lands**
Moonlight and Wheeler Project	14,755	17%	22%
Antelope RSHTR Project	2,036	2%	3%
Dry Flat RSHTR Project	1,294	1%	2%
Camp 14 Project	249	0%	0%
North Moonlight Project	192	0%	0%
Private Land salvage	11,454	13%	n/a
Total on public land	18,526	21%	27%
Total: public and private land	29,980	35%	n/a

As was acknowledged in the Affected Environment section and documented in post-fire survey results, spotted owls can and do utilize unlogged severely burned forests. The cumulative removal of fire-killed or roadside hazard trees on approximately 18,526 acres of public land under this alternative does contribute to overall habitat degradation due to the removal of fire-killed structures supporting habitat. These actions could potentially adversely affect spotted owls if any are present in these areas due to disturbance and loss of foraging habitat.

Based on the latest spotted owl survey information (first year surveys completed in 2008 and second year surveys, for 2009, currently being conducted by PLAS owl crews) implementation of fire-killed or hazard tree removal could be subject to a LOP that would restrict tree removal during the nesting season (March 1 to August 15). Based on known information and as-needed implementation of a LOP, the fire-killed tree removal should not disturb known nesting pairs, and would not alter the current distribution of owl PACs across the PNF. The cumulative removal of fire-killed or roadside hazard trees from 27 percent of public land would modify burned habitat with fire-killed tree structure removal, but would not reduce spotted owl PAC/HRCA occupancy, distribution, or the spotted owl population on the PNF above that resulting from the wildfire. Fire-killed or hazard tree removal within the analysis area would not impact either habitat or population trends on the PNF.

Alternative B (No Action) - Direct/Indirect Effects.
There would be no direct effects to individuals or owl habitat. The greatest impact to the spotted owl and spotted owl habitat was the Moonlight and Antelope fires. Within the analysis area (burn perimeter for both fires), pre-fire, there was 44,483 acres of public land that was suitable spotted owl nesting/foraging habitat (CWHR 5D, 5M, 4D, and 4M); after the fire there is approximately 3,646, acres of suitable spotted owl nesting/foraging habitat located across the analysis area fire landscape.

Twenty five spotted owl PACs (and twenty-eight HRCAs)were present within the project area prior to the Moonlight and Antelope Complex fires and effects to habitat as a result of the fire are displayed in table 58. Of these PACs twenty are determined to no longer function as intended due to loss of habitat and have been removed from the PNF PAC network.

The majority of the burn area is considered unsuitable habitat for spotted owl, and probably would remain unsuitable nesting habitat for 125+ years. Intraspecific competition for quality nesting and foraging habitat outside the burn may increase between owls that used the project area prior to the fire. Within the analysis area, there could be increased intra specific competition for nesting and foraging habitat as a result of a loss of 40,837 acres (public land) of owl habitat in the landscape, forcing owls to share less habitat acres. Elimination or modification of habitat may cause a shift in owl PAC/home range use. Owls may move out of the area affected and seek unoccupied suitable habitat elsewhere. When this shift occurs, displaced owls could be entering another pair’s home range. Increasing the density of owls could result in an additional net loss of owl pairs in the area.

The Montane Chaparral type that would persist with the no action alternative provides unsuitable owl habitat. Prey species preferred by spotted owls (woodrats and flying squirrels) would likely avoid the recent burn area. As the MCP or SMC1-2 habitat matures, woodrats may re-colonize as they are known to utilize earlier successional habitats, especially along edges of shrub fields and conifer/oak stands (Mayer and Laudenslayer, 1990 and personal observation). Flying squirrels would likely be absent in high intensity burn areas until mature conifer habitat develops. The edges between unburned forest or low severity burned patches along the fire perimeter could provide habitat for these prey species. The small patches of forested habitat within the burn that burned at low severity are isolated by large expanses of unsuitable habitat; these patches may be marginal for foraging spotted owls due to the isolation from the forest interior.

Alternative B – Cumulative Effects.
(Please see discussion on pg. 58 – Cumulative effects common to all alternatives)

Table 18. Cumulative acres of proposed and current post-fire treatments in the wildlife analysis area – Alternative B (no action).

	Acres proposed for fire-killed/hazard tree removal under Alt B (no action)	**% of analysis area**	**% on public lands**
Moonlight and Wheeler Project	0	0%	0%
Antelope RSHTR Project	2,036	2%	3%
Dry Flat RSHTR Project	1,294	1%	2%
Camp 14 Project	249	0%	0%
North Moonlight Project	192	0%	0%
Private Land salvage	11,454	13%	n/a
Total on public land	3,771	4%	6%
Total: public and private land	15,225	18%	n/a

Table 18 shows that, under the no action alternative, cumulatively, 3,771 acres of public land have been or would be treated for fire-killed tree removal or roadside hazard tree removal. This is approximately 6% of public land in the analysis area. The remaining untreated acreage (94% of public land), especially dense, forested stands which burned at high intensity, would experience a significant amount of long-term surface fuel loading accumulating over time. In such untreated areas there would be increased risk associated with future fire behaviors, including increased fire severity and rate of spread that could reduce suppression capabilities. This could allow for increased risk to habitat recovery by burning up any reforested (naturally or artificially) stands. Thus the no action alternative does not provide for accelerated recovery and restoration of owl habitat. This alternative may affect, but not likely to lead to federal listing or loss of viability, of the California spotted owl.

Alternative C - Direct/Indirect Effects.
Fire-killed or hazard tree removal would occur on 8,536 acres using only tractor logging systems. Two PACs within the PNF PAC network would be minimally treated (8 acres total) for roadside hazard tree removal only under these actions. Outside of PACs, there would be no removal of fire-killed trees from non-burned parcels or areas burnt at low severity (less than 50 percent basal area mortality). No fire-killed tree removal would occur within currently suitable spotted owl habitat (as defined on pg. 45). Removal of fire-killed or roadside hazard trees in non-suitable habitat would not change the existing condition of the amount of suitable habitat. Narrow corridors of dispersal (live-green forested) habitat within the analysis area, would not be treated for fire-killed or roadside hazard tree removal.

Under this alternative approximately 1,354 acres of fire-killed or hazard tree removal would occur in areas formerly known as PACs and approximately 2,121 acres would occur in what was formerly designated as HRCAs. This combined 3,475 acres proposed for treatment is not suitable owl habitat due to the effects from moderately high and high severity fire, and the PAC numbers have been removed from the PNF spotted owl network of PACs.

Table 16 (pg. 57) shows treatments that are proposed under alternative C that fall within the eight remaining PACs and associated HRCAs. The acres within PACs PL071(1 acre) and PL286 (7 acres) are proposed for roadside hazard removal treatment only. All acres summarized in table 70 reflect areas where fire killed trees or roadside hazard trees are planned for removal. No suitable owl habitat (CWHR 4M, 4D, 5M, 5D) would be entered or altered by the proposed actions.

Under alternative C there would be no new system road construction so no long-term increases in human activities are expected as a result of this action. There would be approximately 18 miles of temporary road constructed under Alternative C to accommodate logging systems. Temporary roads constructed under this alternative would be decommissioned upon completion of the project. Road density would remain the same within the analysis area as pre-fire conditions, which is 2.62 miles of open road/square mile.

Alternative C – Cumulative Effects.
(Please see discussion on pg. 23 - General cumulative effects common to all action alternatives AND please see discussion on pg. 59 – Spotted Owl cumulative effects common to all alternatives)

Table 19 shows all acres of proposed or current treatments from fire-killed or hazard tree removal actions within the analysis area for alternative C. Approximately 24,024 acres on public and private land (27 percent) is proposed for fire-killed or hazard tree removal within the analysis area under alternative C. On public land, approximately 12,307 acres of fire-killed or hazard tree removal would occur under alternative C. This is 18 percent of the 68,408 public land acres within the analysis area. Thus, under this alternative, approximately 56,101 acres (82%) of the fire land base located on public land would not be treated for fire-killed or hazard tree removal. This land base would be supporting various densities of fire-killed trees with the overall snag density (15”dbh or greater)

estimated at 13.3 snags/acre. Fire-killed tree removal would not result in any additional unsuitable spotted owl habitat above what was changed due to wildfire.

Table 19. Acres of proposed and current post-fire treatments in the wildlife analysis area – Alternative C.

	Alt C acres proposed for fire-killed/hazard tree removal	% of analysis area	% on public land
Moonlight and Wheeler Project	8,536	10%	12%
Antelope RSHTR Project	2,036	2%	3%
Dry Flat RSHTR Project	1,294	1%	2%
Camp 14 Project	249	0%	0%
North Moonlight Project	192	0%	0%
Private Land salvage	11,454	13%	n/a
Total on public land	12,307	14%	18%
Total: public and private land	23,761	27%	n/a

As was acknowledged in the Affected Environment section and documented in post-fire survey results, spotted owls can and do utilize unlogged severely burned forests. The cumulative removal of fire-killed or roadside hazard trees on approximately 12,307 acres of public land under this alternative does contribute to overall habitat degradation due to the removal of fire-killed structures supporting habitat. These actions could potentially adversely affect spotted owls if any are present in these areas due to disturbance and loss of foraging habitat.

Based on spotted owl survey information (first year surveys completed in 2008 and second year surveys, for 2009, currently being conducted by PLAS owl crews), implementation of fire-killed or hazard tree removal could be subject to a LOP that would restrict tree removal during the nesting season (March 1 to August 15). Based on known information and as-needed implementation of a LOP, fire-killed or hazard tree removal should not disturb known nesting pairs, and would not alter the current distribution of owl PACs across the PNF. The cumulative removal of fire-killed or hazard trees from 18 percent of public land under this alternative would modify burned habitat with fire-killed tree structure removal, but would not reduce spotted owl PAC/HRCA occupancy, distribution, or the spotted owl population on the PNF above that resulting from the wildfire. Fire-killed or hazard tree removal within the analysis area would not impact either habitat or population trends on the PNF.

Alternative D - Direct/Indirect Effects.

Fire-killed or hazard tree removal would occur on 5,656 acres using only tractor logging systems. Two PACs within the PNF PAC network would be minimally treated (8 acres total) for roadside hazard tree removal only under these actions. Outside of PACs, there would be no removal of fire-killed trees from non-burned parcels or areas burnt at low severity (less than 50 percent basal area mortality). No fire-killed tree removal would occur within currently suitable spotted owl habitat (as defined on pg. 45). Removal of fire-killed or roadside hazard trees in non-suitable habitat would not change the existing

condition of the amount of suitable habitat. Narrow corridors of dispersal (live-green forested) habitat within the analysis area, would not be treated for fire-killed or roadside hazard tree removal. Under this alternative approximately 436 acres of fire-killed or hazard tree removal would occur in areas formerly known as PACs and approximately 920 acres would occur in what was formerly designated as HRCAs. This combined 1,356 acres proposed for treatment is not suitable owl habitat due to the effects from moderately high and high severity fire, and the PAC numbers have been removed from the PNF spotted owl network of PACs.

Table 16 (pg. 57) shows treatments that are proposed under alternative D that fall within the eight remaining PACs and associated HRCAs. The acres within PACs PL071 (1 acre) and PL286 (7 acres) are proposed for roadside hazard removal treatment only. All acres summarized in table 78 reflect areas where fire killed trees or roadside hazard trees are planned for removal. No suitable owl habitat (CWHR 4M, 4D, 5M, 5D) would be entered or altered by the proposed actions.

Under alternative D there would be no new system road construction so no long-term increases in human activities are expected as a result of this action. There would be approximately 13 miles of temporary road constructed under Alternative D to accommodate logging systems. Temporary roads constructed under this alternative would be decommissioned upon completion of the project. Road density would remain the same within the analysis area as pre-fire conditions, which is 2.62 miles of open road/square mile.

Alternative D – Cumulative Effects.
(Please see discussion on pg. 23 - General cumulative effects common to all action alternatives AND please see discussion on pg. 59 – Spotted Owl cumulative effects common to all alternatives)

Table 20 shows all acres of proposed or current treatments from fire-killed or hazard tree removal actions within the analysis area for alternative D. Approximately 21,144 acres on public and private land (24 percent) is proposed for fire-killed or hazard tree removal within the analysis area under alternative D. On public land, approximately 9,427 acres of fire-killed or hazard tree removal would occur under alternative D. This is 14 percent of the 68,408 public land acres within the analysis area. Thus, under this alternative, approximately 58,981 acres (86%) of the fire land base located on public land would not be treated for fire-killed or hazard tree removal. This land base would be supporting various densities of fire-killed trees with the overall snag density (15”dbh or greater) estimated at 13.3 snags/acre. In the long-term, fire-killed tree removal would not result in any additional unsuitable spotted owl habitat above what was changed due to wildfire; but it does in the short term (one to two years) contribute cumulatively to overall habitat degradation when added to the conditions created by wildfire, primarily due to the removal of fire-killed structures supporting habitat.

Table 20. Acres of proposed and current post-fire treatments in the wildlife analysis area – Alternative D.

	Alt D acres proposed	% of analysis	% on public

	for fire-killed/hazard tree removal	area	land
Moonlight and Wheeler Project	5,656	6%	8%
Antelope RSHTR Project	2,036	2%	3%
Dry Flat RSHTR Project	1,294	1%	2%
Camp 14 Project	249	0%	0%
North Moonlight Project	192	0%	0%
Private Land salvage	11,717	13%	n/a
Total on public land	9,427	11%	14%
Total: public and private land	21,144	24%	n/a

As was acknowledged in the Affected Environment section and documented in post-fire survey results, spotted owls can and do utilize unlogged severely burned forests. The cumulative removal of fire-killed or roadside hazard trees on approximately 9,427 acres of public land under this alternative does contribute to overall habitat degradation due to the removal of fire-killed structures supporting habitat. These actions could potentially adversely affect spotted owls if any are present in these areas due to disturbance and loss of foraging habitat.

Based on spotted owl survey information(first year surveys completed in 2008 and second year surveys, for 2009, currently being conducted by PLAS owl crews), implementation of fire-killed or hazard tree removal could be subject to a LOP that would restrict tree removal during the nesting season (March 1 to August 15). Based on known information and as-needed implementation of a LOP, fire-killed or hazard tree removal should not disturb known nesting pairs, and would not alter the current distribution of owl PACs across the PNF. The cumulative removal of fire-killed or hazard trees from 18 percent of public land under this alternative would modify burned habitat with fire-killed tree structure removal, but would not reduce spotted owl PAC/HRCA occupancy, distribution, or the spotted owl population on the PNF above that resulting from the wildfire. Fire-killed or hazard tree removal within the analysis area would not impact either habitat or population trends on the PNF.

Alternative E - Direct/Indirect Effects.

Under Alternative E, roadside hazard tree removal treatments would occur on 4,389 acres using only tractor logging systems. Two PACs within the PNF PAC network would be minimally treated (8 acres total) under these actions. Removal of roadside hazard trees would not change the existing condition of the amount of suitable habitat. Narrow corridors of dispersal (live-green forested) habitat existing within the analysis area would remain after roadside hazard tree removal treatments.

Under this alternative approximately 436 acres of roadside hazard tree removal would occur in areas formerly known as PACs and approximately 920 acres would occur in what was formerly designated as HRCAs. This combined 1,356 acres proposed for treatment is not suitable owl habitat due to the effects from moderately high and high severity fire, and the PAC numbers have been removed from the PNF spotted owl network of PACs.

Table 16 (pg. 57) shows treatments that are proposed under alternative E that fall within the eight remaining PACs and associated HRCAs. The acres within PACs PL071 (1 acre) and PL286 (7 acres) are proposed for roadside hazard removal treatment only. All acres summarized in table 85 reflect areas where fire killed trees or roadside hazard trees are planned for removal. No suitable owl habitat (CWHR 4M, 4D, 5M, 5D) would be entered or altered by the proposed actions.

Under alternative E there would be no new system road construction so no long-term increases in human activities are expected as a result of this action. Temporary roads constructed under this alternative would be decommissioned upon completion of the project. Road density would remain the same within the analysis area as pre-fire conditions, which is 2.62 miles of open road/square mile.

Alternative E – Cumulative Effects.
(Please see discussion on pg. 23 - General cumulative effects common to all action alternatives AND please see discussion on pg. 59 – Spotted Owl cumulative effects common to all alternatives)

Table 21 shows all acres of proposed or current treatments from hazard tree removal actions within the analysis area for alternative E. Approximately 19,877 acres on public and private land (23 percent) is proposed for fire-killed or roadside hazard tree removal within the analysis area under alternative E. On public land, approximately 8,160 acres of fire-killed or hazard tree removal would occur under alternative E. This is 12 percent of the 68,408 public land acres within the analysis area. Thus, under this alternative, approximately 60,248 acres (88 %) of the fire land base located on public land would not be treated for fire-killed or hazard tree removal. This land base would be supporting various densities of fire-killed trees with the overall snag density (15”dbh or greater) estimated at 13.3 snags/acre. In the long-term, fire-killed tree removal would not result in any additional unsuitable spotted owl habitat above what was changed due to wildfire; but it does in the short term (one to two years) contribute cumulatively to overall habitat degradation when added to the conditions created by wildfire, primarily due to the removal of fire-killed structures supporting habitat.

Table 21. Acres of proposed and current post-fire treatments in the wildlife analysis area – Alternative E

	Alt E acres proposed for fire-killed/hazard tree removal	**% of analysis area**	**% on public land**
Moonlight and Wheeler Project	4,389	5%	6%
Antelope RSHTR Project	2,036	2%	3%
Dry Flat RSHTR Project	1,294	1%	2%
Camp 14 Project	249	0%	0%
North Moonlight Project	192	0%	0%

Private Land salvage	11,717	13%	n/a
Total on public land	8,160	9%	12%
Total: public and private land	19,877	23%	n/a

As was acknowledged in the Affected Environment section and documented in post-fire survey results, spotted owls can and do utilize unlogged severely burned forests. The cumulative removal of fire-killed or roadside hazard trees on approximately 8,160 acres of public land under this alternative does contribute to overall habitat degradation due to the removal of fire-killed structures supporting habitat. These actions could potentially adversely affect spotted owls if any are present in these areas due to disturbance and loss of foraging habitat.

Based on spotted owl survey information(first year surveys completed in 2008 and second year surveys, for 2009, currently being conducted by PLAS owl crews), implementation of fire-killed or hazard tree removal could be subject to a LOP that would restrict tree removal during the nesting season (March 1 to August 15). Based on known information and as-needed implementation of a LOP, fire-killed or hazard tree removal should not disturb known nesting pairs, and would not alter the current distribution of owl PACs across the PNF. The cumulative removal of fire-killed or hazard trees from 18 percent of public land under this alternative would modify burned habitat with fire-killed tree structure removal, but would not reduce spotted owl PAC/HRCA occupancy, distribution, or the spotted owl population on the PNF above that resulting from the wildfire. Fire-killed or hazard tree removal within the analysis area would not impact either habitat or population trends on the PNF.

Conclusion and Determination for all action alternatives: The Moonlight and Antelope Complex fires resulted in the reduction of 20 PACs on the PNF; thus currently there are 276 PACs across the PNF. It is expected that the spotted owl population on the PNF may decline in response to the loss of PACs and suitable nesting and foraging habitat to high severity fire. The large scale fragmentation created by these stand replacement fires across 80,000 acres immediately reduced the spotted owl carrying capacity on the Plumas NF that will not recover and support owl habitat for numerous decades. These wildfires may also create a large gap and potential bottleneck impeding owl dispersion in the eastern most range of the species. The removal of fire-killed trees in unsuitable habitat would not cumulatively add to this potential population distribution decline. Restoration as proposed under all action alternatives, in terms of accelerating the availability of mature conifer stands through reforestation as well as natural establishment, could eventually improve conditions for spotted owl re-occupancy.

The proposed salvage actions under alternatives A, C, and D, where fire-killed and hazard trees would be removed, would reduce long-term hazardous surface fuels in those areas that would accumulate over time if nothing was done. This fuel reduction would have a beneficial effect on future fire behaviors, including decreased fire intensity and rate of spread that could enhance suppression capabilities and firefighter safety. This could allow for increased protection of the developing stands, resulting from reforestation

efforts, and possibly allow for restoration of forested habitat suitable for owls in approximately 100 years.

Based on the changes to habitat expected from the fire-killed and hazard tree removal and subsequent reforestation, as well as incorporation of LOP's to reduce disturbance during critical periods if needed, the action alternatives (A, C, D, and E) of the Moon-Wheeler Fires Recovery and Restoration Project may affect, but not likely to lead to federal listing or loss of viability, of the California spotted owl.

Northern Goshawk

Surveys for goshawk were conducted within the analysis area in 2005 and 2006 for the Diamond projects (KWR 2006). Seven goshawk PACs were impacted by the fire, all of which are 100% within the burn area (attachment 6).

The northern goshawk requires mature conifer and deciduous forest with large trees, snags, and downed logs, dense canopy closure for nesting and forests with moderately open overstories, open understories interspersed with meadows, brush patches, or other natural or artificial openings and riparian areas for foraging. Studies indicate that goshawks typically select for canopy closures greater than 60% for nesting (Hall 1984, Richter and Callas 1996, Keane 1997). The goshawk usually nests on north slopes, near water, in the densest parts of stands, but close to openings (CDFG 2006). The following CWHR types, typical of the project area prior to the fire, provide high nesting and feeding habitat capability: Sierran Mixed Conifer, White Fir, Red Fir, Ponderosa Pine, Lodgepole Pine, and Eastside Pine (5D, 5M, 4D, 4M). (SNFPA FEIS Vol.3, Chap.3, part 4.4 pg 116).

The northern goshawk forages in wooded areas (mature conifer and deciduous habitats) and uses snags and dead-topped trees for observation and prey-plucking perches. This species primarily feeds on birds, from robin to grouse in size, but also includes small mammals, of squirrel and rabbit size. Goshawks catch their prey in the air, on ground, or in vegetation, using fast, searching flight, or a rapid dash from a perch. Goshawks have been observed perched, and presumably foraging, within the burn area created by the Stream Fire (Rotta, personal observation, 2007).

Post Fire Conditions

High severity wildfire results in long term harmful effects to goshawk habitat due to reduction in existing large tree component and dense forested stand structure, as well as a short to long term reductions in availability of structural diversity provided by mature riparian habitat. The foraging goshawk can take advantage of the short term increase in prey availability resulting from the increase in snag and down wood component throughout the burn, especially on edges adjacent to low severity and unburned habitat. Wildfires the size of the Moonlight and Antelope Complex usually result in habitat loss and large scale openings, fragmenting suitable nesting habitat. Table 22 displays the effects of the Moonlight and Antelope Complex fires on suitable goshawk habitat on FS lands within the analysis area. Approximately 41,605 acres of suitable nesting and

foraging habitat was rendered unsuitable on National Forest Lands as a result of the stand replacing wildfire.

Table 22. Effects of Moonlight and Antelope Complex fires on Goshawk Habitat (all acres approximate and all are National Forest).

Habitat	Pre-Fire Acres	Post Fire Acres	*Reduction in suitable habitat (%)*
*Suitable Habitat (5M, 5D,4M, 4D)**	*45,660*	*4,055*	*41,605 acres* *91% reduction*

*SMC, PPN, WFR, RFR, LPN, EPN

Table 23 shows the existing condition of the seven goshawk PACs within the analysis area. Six PACs burned at high to moderately high severity over greater than 60 percent of all acreage. PAC T14 burned at these severity levels on only 27 percent. The fire effects rendered most habitat within each PAC unsuitable with high severity burn areas converting to MCP or SMC1 and lower severity burn areas opening up the canopy to a CWHR closure class of P (25-39 percent canopy closure).

Table 23: Existing Condition of Northern Goshawk PACs within analysis area.

PAC #	PAC Acres	Acres Burned at High or Moderately High Severity (BAM* ≥ 50%)	% of PAC burned at High or Moderately High Severity	Remaining Suitable CWHR 4M/4D/5M/5D Acres**
T07	177	109	62%	48
T08	182	120	66%	4
T09	232	173	75%	33
T13	206	171	83%	0
T14	124	34	27%	15
T24	231	166	72%	36
T36	222	211	95%	0
TOTAL	920	600	65%	103

*SMC, PPN, WFR, RFR, LPN, EPN

The SNFPA ROD (2004) defines Northern Goshawk PAC land allocation and associated desired conditions. It also addresses what actions can be taken after a stand-replacing event, such as a wildfire. The SNFPA ROD states: “PACs may be removed from the network after a stand-replacing event if the habitat has been rendered unsuitable as a northern Goshawk PAC and there are no opportunities for re-mapping the PAC in proximity to the affected PAC” (SNFPA ROD 2004, pg. 38). Attachment 6 shows the remaining suitable acres in proximity to all PACs. There doesn’t appear to be any opportunities to re-map any of the seven PACs, based upon no large (200 acres or more), contiguous patches of suitable present within close proximity to each PAC. Therefore, goshawk PACs T07, T08, T09,

T13, T14, T24, and T36 have been rendered unsuitable by the wildfires and have been removed from the Plumas NF Goshawk PAC network.

Moon-Wheeler Project Effects to the Northern Goshawk

Alternative A - Direct/Indirect Effects.

There would be no direct effects to individuals or goshawk habitat. The greatest impact to the goshawk and goshawk habitat was the Moonlight and Antelope Complex fires. Within the analysis area (burn perimeter), prior to the fires, there was 45,660 acres of public land of suitable goshawk nesting/high quality foraging habitat (CWHR 5D, 5M, 4D, and 4M); after the fire there is currently approximately 4,055 acres of public land that are suitable goshawk nesting/high quality foraging habitat located across the fire landscape within the analysis area

Alternative A would remove fire-killed or hazard trees from high and moderate severity burned areas, up to 14,755 acres, which do not support habitat considered suitable for goshawk. This action would have very minimal effect on live trees, would not reduce live tree canopy cover, or degrade any nesting and foraging habitat for goshawk. The present condition of late-successional forest habitat within the analysis area would not change from the existing condition created by the wildfire. Thus no post fire goshawk habitat would be logged, degraded and/or rendered unsuitable by the proposed action.

Table 24. Acres treated for fire-killed or hazard tree removal in areas formerly known as Northern goshawk PACs.

PAC #	Alt A acres treated	Alt C acres treated	Alt D acres treated	Alt E acres treated
T07	74	63	36	36
T08	38	29	29	29
T09	103	28	28	28
T13	122	0	0	0
T14	16	16	16	16
T24	14	14	14	14
T36	0	0	0	0
Total	366	150	123	123

Table 24 shows the acres treated in areas formerly known as Northern goshawks PACs. Approximately 366 acres of fire-killed tree removal would occur in areas formerly known as PACs. This fire-killed tree removal acreage is not suitable goshawk habitat due to fire effects. Table 24 is provided for information and for future acre accountability.

Removal of fire-killed trees that could be available for additional prey species if left on site may incrementally impose a decrease in habitat suitability for goshawks from pre and post treatment conditions. No suitable nesting or foraging habitat would be directly affected by fire-killed tree removal, as only fire-killed trees within moderately high and high severity burn areas would be removed.

Alternative A – Cumulative Effects.
The cumulative effects on the northern Goshawk are essentially the same as for the spotted owl under this alternative. Please refer to the discussion on pg. 59 titled: Cumulative effects common to all alternatives - and to table 17 for a discussion and summary of cumulative effects within the analysis area.

Alternative B (No Action) - Direct/Indirect Effects.
There would be no direct effects to individuals or goshawk habitat. The greatest impact to the goshawk and goshawk habitat was the Moonlight and Antelope Complex Fires. Within the analysis area (burn perimeter), prior to the Moonlight and Antelope fires, there was 45,660 acres of public land are suitable goshawk nesting/high quality foraging habitat (CWHR 5D, 5M, 4D, and 4M); after the fire there is currently approximately 4,055 acres of public land that are suitable goshawk nesting/foraging habitat located across the fire landscape within the analysis area.

The majority of the burn area is considered unsuitable habitat for goshawks, and probably would remain unsuitable nesting habitat for 125+ years. Intraspecific competition for quality nesting and foraging habitat outside the burn may increase between goshawks that may have used the project area prior to the fire.

The Montane Chaparral type that would persist with the no action alternative provides some low suitability foraging habitat in all seral stages for goshawks (CWHR Version 8.0). Goshawks prey on small mammals as well as catch birds on the wing. They then perch on plucking posts to feed. These plucking posts are usually located within forested stands, providing an element of security cover for feeding goshawks. The edges between unburned forest or low intensity burned patches within the interior of the burn are attractive edges to a variety of prey species for goshawk (jays, flickers, golden mantled ground squirrel). The small patches of forested habitat within the burn that burned at low intensity can serve as areas for plucking posts and where goshawks can perch and work the edges for foraging.

Alternative B (No Action) – Cumulative Effects.
The cumulative effects on the northern Goshawk are essentially the same as for the spotted owl under this alternative. Please refer to the discussion on pg. 59 titled: Cumulative effects common to all alternatives - and to table 18 for a discussion and summary of cumulative effects within the analysis area.

The no action alternative does not provide for accelerated recovery and restoration of goshawk habitat. This alternative may affect, but not likely to lead to federal listing or loss of viability, of the northern goshawk.

Alternative C - Direct/Indirect Effects.
There would be no direct effects to individuals or goshawk habitat. The greatest impact to the goshawk and goshawk habitat was the Moonlight and Antelope Complex fires. Within the analysis area, prior to the fires, there was 45,660 acres of public land of suitable goshawk nesting/high quality foraging habitat (CWHR 5D, 5M, 4D, and 4M); after the fire there is currently approximately 4,055 acres of public land that are suitable goshawk

nesting/high quality foraging habitat located across the fire landscape within the analysis area

Alternative C would remove, using tractor logging systems, fire-killed or hazard trees from high and moderate severity burned areas, up to 8,536 acres, which do not support habitat considered suitable for goshawk. This action would have very minimal effect on live trees, would not reduce live tree canopy cover, or degrade any nesting and foraging habitat for goshawk. The present condition of late-successional forest habitat within the analysis area would not change from the existing condition created by the wildfire. Thus no post fire goshawk habitat would be logged, degraded and/or rendered unsuitable by the proposed action.

Approximately 150 acres of fire-killed tree removal would occur in areas formerly known as PACs, displayed in table 24 (pg. 70). This fire-killed tree removal acreage is not suitable goshawk habitat due to fire effects. Table 24 is provided for information and for future acre accountability.

Removal of fire-killed or roadside hazard trees that could be available for additional prey species if left on site may incrementally impose a decrease in habitat suitability for goshawks from pre and post treatment conditions. No suitable nesting or foraging habitat would be directly affected by fire-killed tree removal, as only fire-killed trees within moderately high and high severity burn areas would be removed.

Alternative C – Cumulative Effects.
The cumulative effects on the northern Goshawk are essentially the same as for the spotted owl under this alternative. Please refer to the discussion on pg. 59 titled: Cumulative effects common to all alternatives - and to table 19 for a discussion and summary of cumulative effects within the analysis area.

Alternative D - Direct/Indirect Effects.
There would be no direct effects to individuals or goshawk habitat. The greatest impact to the goshawk and goshawk habitat was the Moonlight and Antelope Complex fires. Within the analysis area (burn perimeter), prior to the fires, there was 45,660 acres of public land of suitable goshawk nesting/high quality foraging habitat (CWHR 5D, 5M, 4D, and 4M); after the fire there is currently approximately 4,055 acres of public land that are suitable goshawk nesting/high quality foraging habitat located across the fire landscape within the analysis area

Alternative D would remove, using tractor logging systems, fire-killed or hazard trees from high and moderate severity burned areas, up to 5,656 acres, which do not support habitat considered suitable for goshawk. This action would not remove live trees, would not reduce live tree canopy cover, or degrade any nesting and foraging habitat for goshawk. The present condition of late-successional forest habitat within the analysis area would not change from the existing condition created by the wildfire. Thus no post fire goshawk habitat would be logged, degraded and/or rendered unsuitable by the proposed action.

Approximately 123 acres of fire-killed tree removal would occur in areas formerly known as PACs, displayed in table 24 (pg. 70). This fire-killed tree removal acreage is not

suitable goshawk habitat due to fire effects. Table 24 is provided for information and for future acre accountability.

Removal of fire-killed or roadside hazard trees that could be available for additional prey species if left on site may incrementally impose a decrease in habitat suitability for goshawks from pre and post treatment conditions. No suitable nesting or foraging habitat would be directly affected by fire-killed tree removal, as only fire-killed trees within moderately high and high severity burn areas would be removed.

Alternative D – Cumulative Effects.
The cumulative effects on the northern Goshawk are essentially the same as for the spotted owl under this alternative. Please refer to the discussion on pg. 59 titled: Cumulative effects common to all alternatives - and to table 20 for a discussion and summary of cumulative effects within the analysis area.

Alternative E - Direct/Indirect Effects.
There would be no direct effects to individuals or goshawk habitat. The greatest impact to goshawks and goshawk habitat was the Moonlight and Antelope Complex fires. Within the analysis area (burn perimeter), prior to the fires, there was 45,660 acres of public land of suitable goshawk nesting/high quality foraging habitat (CWHR 5D, 5M, 4D, and 4M); after the fire there is currently approximately 4,055 acres of public land that are suitable goshawk nesting/high quality foraging habitat located across the fire landscape within the analysis area

Alternative E would remove, using tractor logging systems, roadside hazard trees from, up to 4,389 acres that do not support habitat considered suitable for goshawk. This action would not remove live trees, would not reduce live tree canopy cover, or degrade any nesting and foraging habitat for goshawk. The present condition of late-successional forest habitat within the analysis area would not change from the existing condition created by the wildfire. Thus no post fire goshawk habitat would be logged, degraded and/or rendered unsuitable by the proposed action.

Approximately 123 acres of fire-killed tree removal would occur in areas formerly known as PACs (same as under alternative D – see table 24, pg. 70) This fire-killed tree removal acreage is not suitable goshawk habitat due to fire effects and is provided for information and for future acre accountability.

Removal of roadside hazard trees that could be available for additional prey species if left on site may incrementally impose a decrease in habitat suitability for goshawks from pre and post treatment conditions. No suitable nesting or foraging habitat would be directly affected by roadside hazard tree removal, as only roadside hazard trees within moderately high and high severity burn areas would be removed.

Alternative E – Cumulative Effects.
The cumulative effects on the northern Goshawk are essentially the same as for the spotted owl under this alternative. Please refer to the discussion on pg. 59 titled: Cumulative effects common to all alternatives - and to table 21 for a discussion and summary of cumulative effects within the analysis area.

Determination for all action alternatives: Based on the changes to habitat expected from the fire-killed tree removal and subsequent reforestation, the action alternatives (A, C, D, and E) of the Moonlight and Wheeler Fires Recovery and Restoration Project may affect individuals, but is not likely to result in a trend toward federal listing or loss of viability for the Northern goshawk.

American Marten

There are over 40 records of **marten** observations/detections on the Plumas National Forest dating back to 1975. None have been detected in the watersheds impacted by the Moonlight and Antelope Complex fires. Extensive surveys using both soot covered track plates and baited photo stations have been conducted since the mid-90s across the majority of the Mt Hough District landscape; no marten have been found (documented survey results on file). Based on project surveys conducted within and adjacent to the project area between 2000 and 2003 (project surveys include Antelope/Border, Cold, Wild, and Treatment Units 9 and 10 for Plumas Lassen Administrative Study (PLAS)), that have not detected marten, it is suspected that marten are likely not present in the project area. Based on Zielinski (2005), trends in marten detections in Plumas County, and by inference Plumas National Forest, from the early 1900's to the late 1900's are downward, and according to Zielinski, primarily due to relatively small amounts of late seral/old growth forest attributes.

The American marten is no longer considered a Management Indicator Species (MIS) on the Plumas NF (USDA 2007b). American marten has been monitored throughout the Sierra Nevada as part of general surveys and studies from 1996-2002 (Zielinski et al. 2005). Since 2002, the American marten has been monitored on the Sierra Nevada forests as part of the Sierra Nevada Forest Plan Amendment (SNFPA) monitoring plan (USDA Forest Service 2005, 2006). Current data at the rangewide, California, and Sierra Nevada scales indicate that, although marten appear to be distributed throughout their historic range, their distribution has become fragmented in the southern Cascades and northern Sierra Nevada, particularly in Plumas County (USDA Forest Service 2007b). The distribution appears to be continuous across high-elevation forests from Placer County south through the southern end of the Sierra Nevada. This bio-regional monitoring conducted under the Sierra Nevada Forest Plan Amendment has not resulted in new detections on the Plumas NF; it appears marten are locally distributed only in and around the Lakes Basin area of the Plumas NF. Lakes Basin is over 27 air miles south of the Moon-Wheeler Project.

Post Fire Conditions

High severity wildfire results in long term harmful effects to marten habitat due to reduction in existing large tree component and dense forested stand structure. In some moderate to moderately low severity burn areas still supporting live trees (25-50% basal area mortality) and low severity areas that support live trees and forested canopy (<25% basal area mortality), there could be some short term increase in snag and down wood component available for marten prey species and marten den structures. Wildfires the

size of Moonlight and Antelope Complex usually result in habitat loss and large scale openings, fragmenting suitable denning, foraging and dispersal habitat.

Table 25. Effects of Moonlight and Antelope Complex Fires on Marten Suitable Habitat (all acres approximate and all are National Forest).

Habitat	Pre-Fire Acres	Post Fire Acres	*Reduction in suitable habitat (%)*
*Suitable Habitat (5M, 5D,4M, 4D)**	*44,055*	*3,847*	*40,208 acres* *91% reduction*

* SMC, WFR, RFR, LPN, EPN

Table 25 shows the effects of the Moonlight and Antelope Complex fires on marten habitat within the analsyis area. Approximately 40,208 acres of suitable denning and foraging habitat was rendered unsuitable on National Forest Lands as a result of the stand replacing wildfire. The remaining suitable habitat (3,847 total acres) provides 379 acres of marten denning habitat (CWHR 4D and 5D) and 3,468 acres of marten foraging habitat (CWHR 4M and 5M).

The Plumas National Forest carnivore network consists of scattered known marten locations, large habitat management areas, and wide dispersal or connecting corridors. The management intent of the network is to provide a continuously connected system of habitats focused on the needs of marten and other mesocarnivores (fisher, wolverine, Sierra Nevada red fox). This network is not incorporated into the Plumas LRMP as a land allocation with standards and guidelines; it is a plan to project analysis tool designed to maintain future options.

There are 22,309 acres of the carnivore network in the Moonlight and Antelope Complex fire perimeters, much of which burned at high to moderately high severity. Based on the latest post fire vegetation map, crosswalked to CWHR, only 1,831 acres of suitable habitat exists in the carnivore network within the Moon-Wheeler analysis area (attachment 7). It is likely that the efficacy of the carnivore network in providing a linkage from the Plumas to the Lassen has been greatly compromised by the effects from these wildfires.

Moon-Wheeler Project Effects to the American Marten

Alternative A - Direct/Indirect Effects.

Alternative A would remove fire-killed or roadside hazard trees from high and moderate severity burned areas (up to 14,755 acres) that do not support habitat considered suitable for marten. This action would would not reduce live tree canopy cover, or degrade any denning, resting, and foraging habitat for marten. There would be no fire-killed tree removal from CWHR types still classified as 4M, 4D, 5M, 5D. The present condition of late-successional forest habitat within the analysis area would not change from the existing condition created by the wildfire. Thus no marten habitat would be logged or rendered unsuitable by the proposed actions. There may be instances where individual live

trees may be cut for safety purposes or to facilitate access to harvest fire-killed trees. These instances are expected to be rare and impacts to existing live tree stands minimal.

Treatments are proposed within the PNF draft carnivore network. Under alternative A, this project would treat 5,283 acres for fire-killed (or salvage) tree removal and 1,616 acres for roadside hazard tree removal, for a total of 6,899 treated acres within the carnivore network. As stated previously, little to no live trees would be removed or impacted by the project's actions and there is expected to be no change in present CWHR types. The remaining CWHR 4M/4D/5M/5D stands, which provide suitable habitat and connectivity for the marten and other mesocarnivores, would not be treated and only minimally affected by this project (due to incidental removal of live trees for operability, which would be of minimal size and scale, and highly dispersed, and would have negligible effects on stand structure). .

The open road density within the project area is 2.62 miles of open road/square mile. Open road density would remain the same with this alternative. According to early habitat models (Freel 1991) this road density provides low-no habitat capability for the marten and other forest carnivores.

Alternative A – Cumulative Effects.
The cumulative effects on the American marten are essentially the same as for the spotted owl under this alternative. Please refer to the discussion on pg. 59 titled: Cumulative effects common to all alternatives - and to table 17 for a discussion and summary of cumulative effects within the analysis area.

Alternative B (No Action) - Direct/Indirect Effects.
There would be no direct effects to individuals or marten habitat. The greatest impact to the marten and marten habitat was the Moonlight and Antelope Complex Fires. Within the analysis area (burn perimeter), prior to the Moonlight and Antelope fires, there was 544,055 acres of public land that are suitable marten denning/foraging habitat (CWHR 5D, 5M, 4D, and 4M); after the fire there is currently approximately 3,874 acres of public land that are suitable marten nesting/foraging habitat located across the fire landscape within the analysis area.

The majority of the burn area is considered unsuitable habitat for marten, and probably would remain unsuitable nesting habitat for 125+ years. The Montane Chaparral type that would persist with the no action alternative does not provide any suitable habitat in all seral stages for marten. Since this species avoids areas of open canopy cover, if individuals are present they would likely avoid large areas of the Moonlight and Antelope Complex fires until a dense conifer overstory develops. This would include the 3,874 acres of public land remaining suitable within the analysis area since they are largely in a discontinuous arrangement and isolated by large expanses of unsuitable habitat.

The open road density within the project area is 2.62 miles of open road/square mile. Open road density would remain the same with this alternative. According to early habitat

models (Freel 1991) this road density provides low-no habitat capability for the marten and other forest carnivores.

Alternative B (No Action) – Cumulative Effects.
The cumulative effects on the American marten are essentially the same as for the spotted owl under this alternative. Please refer to the discussion on pg. 59 titled: Cumulative effects common to all alternatives - and to table 18 for a discussion and summary of cumulative effects within the analysis area.

The no action alternative does not provide for accelerated recovery and restoration of marten habitat. This alternative may affect, but not likely to lead to federal listing or loss of viability, of the American marten.

Alternative C - Direct/Indirect Effects.
Alternative C would remove using tractor logging systems fire-killed or roadside hazard trees from high and moderate severity burned areas (up to 8,536 acres) that do not support habitat considered suitable for marten. This action would not reduce live tree canopy cover, or degrade any denning, resting, and foraging habitat for marten. There would be no fire-killed tree removal from CWHR types still classified as 4M, 4D, 5M, 5D. The present condition of late-successional forest habitat within the analysis area would not change from the existing condition created by the wildfire. Thus no marten habitat would be logged or rendered unsuitable by the proposed actions. There may be instances where individual live trees may be cut for safety purposes or to facilitate access to harvest fire-killed trees. These instances are expected to be rare and impacts to existing live tree stands minimal.

Treatments are proposed within the PNF draft carnivore network. Under alternative C, this project would treat 1,558 acres for fire-killed (or salvage) tree removal and 1,616 acres for roadside hazard tree removal, for a total of 3,174 treated acres within the carnivore network. As stated previously, little to no live trees would be removed or impacted by the project's actions and there is expected to be no change in present CWHR types. The remaining CWHR 4M/4D/5M/5D stands, which provide suitable habitat and connectivity for the marten and other mesocarnivores, would not be treated and only minimally affected by this project (due to incidental removal of live trees for operability, which would be of minimal size and scale, and highly dispersed, and would have negligible effects on stand structure).

The open road density within the project area is 2.62 miles of open road/square mile. Open road density would remain the same with this alternative. According to early habitat models (Freel 1991) this road density provides low-no habitat capability for the marten and other forest carnivores.

Alternative C – Cumulative Effects.
Cumulative EffectsThe cumulative effects on the American marten are essentially the same as for the spotted owl under this alternative. Please refer to the discussion on pg. 59 titled: Cumulative effects common to all alternatives - and to table 19 for a discussion and summary of cumulative effects within the analysis area.

Alternative D - Direct/Indirect Effects.
Alternative D would remove using tractor logging systems fire-killed or roadside hazard trees from high and moderate severity burned areas (up to 5,656 acres) that do not support habitat considered suitable for marten. This action would not reduce live tree canopy cover, or degrade any denning, resting, and foraging habitat for marten. There would be no fire-killed tree removal from CWHR types still classified as 4M, 4D, 5M, 5D. The present condition of late-successional forest habitat within the analysis area would not change from the existing condition created by the wildfire. Thus no marten habitat would be logged or rendered unsuitable by the proposed actions. There may be instances where individual live trees may be cut for safety purposes or to facilitate access to harvest fire-killed trees. These instances are expected to be rare and impacts to existing live tree stands minimal.

Treatments are proposed within the PNF draft carnivore network. Under alternative D, this project would treat 136 acres for fire-killed (or salvage) tree removal and 1,616 acres for roadside hazard tree removal, for a total of 1,752 treated acres within the carnivore network. As stated previously, little to no live trees would be removed or impacted by the project's actions and there is expected to be no change in present CWHR types. The remaining CWHR 4M/4D/5M/5D stands, which provide suitable habitat and connectivity for the marten and other mesocarnivores, would not be treated and only minimally affected by this project (due to incidental removal of live trees for operability, which would be of minimal size and scale, and highly dispersed, and would have negligible effects on stand structure).

The open road density within the project area is 2.62 miles of open road/square mile. Open road density would remain the same with this alternative. According to early habitat models (Freel 1991) this road density provides low-no habitat capability for the marten and other forest carnivores.

Alternative D – Cumulative Effects.
Cumulative EffectsThe cumulative effects on the American marten are essentially the same as for the spotted owl under this alternative. Please refer to the discussion on pg. 59 titled: Cumulative effects common to all alternatives - and to table 20 for a discussion and summary of cumulative effects within the analysis area.

Alternative E - Direct/Indirect Effects.
Alternative E would remove using tractor logging systems roadside hazard trees from burned areas (up to 4,389 acres) that do not support habitat considered suitable for marten. This action would not reduce live tree canopy cover, or degrade any denning, resting, and foraging habitat for marten. The present condition of late-successional forest habitat within the analysis area would not change from the existing condition created by the wildfire. Thus no marten habitat would be logged or rendered unsuitable by the proposed actions. There may be instances where individual live trees may be cut for safety purposes or to facilitate access to harvest fire-killed trees. These instances are expected to be rare and impacts to existing live tree stands minimal.

Treatments are proposed within the PNF draft carnivore network. Under alternative E, this project would treat 1,616 acres for roadside hazard tree removal. As stated previously, little to no live trees would be removed or impacted by the project's actions and there is expected to be no change in present CWHR types. The remaining CWHR 4M/4D/5M/5D stands, which provide suitable habitat and connectivity for the marten and other mesocarnivores, would not be treated and only minimally affected by this project.

The open road density within the project area is 2.62 miles of open road/square mile. Open road density would remain the same with this alternative. According to early habitat models (Freel 1991) this road density provides low-no habitat capability for the marten and other forest carnivores.

Alternative E – Cumulative Effects.
The cumulative effects on the American marten are essentially the same as for the spotted owl under this alternative. Please refer to the discussion on pg. 59 titled: Cumulative effects common to all alternatives - and to table 21 for a discussion and summary of cumulative effects within the analysis area.

Determination for all action alternatives: Based on past survey work, it is likely that marten do not occur in the analysis area. Fire-killed or roadside tree removal under all action alternatives (A, C, D, and E) of the Moonlight and Wheeler Fires Recovery and Restoration Project would not impact either marten habitat or population trends on the PNF. Considering the rare chance that individuals are present in the analysis area, each action alternative may affect individuals, but is not likely to result in a trend toward federal listing or loss of viability for the American marten.

Pallid Bat

A year-round resident in California, pallid bats are generally associated with dry open areas such as the desert or Great Basin; however, they are occasionally found in forest environments including hardwood communities up to 10,000 feet in elevation (Ziener et al. 1990). This bat is most commonly found in open dry habitats with rocky areas for roosting (SNFPA 2001) and most prevalent within edges, open stands, and open areas without trees. Roost sites consist of crevices in rock outcroppings, caves, hollow trees, snags, mines, buildings and bridges (Ibid). Similar structures are used for night roosting. Pallid bats generally forage around rocky outcrops, cliffs, and crevices with access to open habitats and close to the ground, feeding on moths, scorpions, and spiders (BCI, 2004). The SNFPA EIS (2001) emphasizes the protection and enhancement of both westside foothill oaks and montane oaks to provide for pallid bats, which have been identified as important foraging habitat for this species.

There are no records of this species within or adjacent to the analysis area. Survey efforts and detections of pallid bats have occurred at various locations across the Forest since 1992. A portion of Indian Creek within the analysis area was surveyed for bats but no

pallid bats were detected during this effort (Lengas & Bumpus 1992, 1993). The closest detections of pallid bat were in 1991 at Lowe Flat north of Antelope Lake approximately 7 miles northeast of the project area.

Post Fire Conditions

High severity wildfire could result in long term harmful effects to pallid bat habitat due to reduction in existing large tree component, reduction in oak and riparian habitat. This species can take advantage of the increase in snag component for roosting sites and early seral shrub habitat and down woody material for prey availability.

The analysis area supports numerous rock outcrops with associated crevices; hollow trees and snags have been recruited over time within the project area as there has been no salvage or hazard tree removal on National Forest land for many years in this area. Black oak is scattered throughout in limited amounts within the stands to be treated. Incidental fire-killed black oak trees are scattered throughout the western portion of the analysis area.

Moon-Wheeler Project Effects to the Pallid Bat

All Action Alternatives – Direct/Indirect Effects.

Direct effects from the proposed actions are possible if this species occurs in the analysis area. Destruction of active roosts through felling or removal of dead trees with hollows could displace or harm individual bats. Chain saw activity or the use of heavy equipment causing ground vibrations may cause noise and tremor disturbance significant enough to cause temporary or permanent roost abandonment resulting in lowered reproductive success. These effects would be most severe during the breeding season (May 20 to August 15) when the potential exists for disturbance to active breeding females and maternity colonies. Activities conducted during the winter months can potentially disturb hibernacula sites (winter shelters), causing species arousal and use of crucial energy reserves.

Potential direct effects include removal of fire-killed or hazard trees, downed woody fuel, and subsequent reforestation. About 22 percent of Forest service land is proposed for salvage or roadside hazard harvest under Alternative A (14,755 acres proposed out of 68,408 FS acres in analysis area). Alternative C proposes to treat 8,536 acres (12%), alternative D - 5,656 acres (8%), and alternative E - 4,389 acres (6%). Dead or hazard tree removal would not change the CWHR type within any stand as dead trees do not contribute to canopy closure. The proposed dead tree removal would have no effect on the residual live tree size, canopy cover or live-tree basal area.

All Action Alternatives – Cumulative Effects.

(Please refer to pg. 23 of this report for a discussion of general cumulative effects common to all action alternatives. Also, please refer to the cumulative effects section for the spotted owl on page 59 for further discussion of relevant cumulative effects.)

Both the Hungry and Boulder Fires in 2006 created abundant fire-killed tree habitat. Both fires combined to burn a total of around 3,547 acres; approximately 324 acres of dead tree removal occurred on these burned acres (9%). The availability of dead trees for bat use in the Antelope Lake area is abundant.

Cumulatively (after all other hazard tree removal and fire salvage projects are included) all action alternatives would exclude salvage and roadside hazard logging entirely from the majority of public lands: 73 % would be left untreated under alternative A, 82% under Alternative C, 86% under Alternative D, and 88% under Alternative E. Consequently, large areas of unsalvaged and untreated areas would exist under all action alternatives, maintaining forest stand structure that would provide for biological legacy values as described by Lindenmayer and Noss (2006). In addition, snag retention areas within salvage harvest units and exclusion of salvage harvest from low to moderate burn severity patches would provide for biological legacies within and outside the proposed treatment perimeters such as fire-killed and fire-damaged trees and large live and dead trees that have high habitat value (Lindenmayer and Noss 2006). Equipment restriction zones (in units where ground-based logging is proposed) and snag retention guidelines within RHCAs are designed to provide for protection of aquatic ecosystems and retain and recruit structure such as large down woody debris within riparian areas (Lindenmayer and Noss 2006, Reeves et al 2006).

Reforestation of national forest lands where no salvage harvest is proposed began within the analysis area in spring 2008. A combination of low density wide spaced cluster planting in the Antelope Lake and Babcock Peak areas and low density square-spaced planting in the Camp 14 area occurred within areas of high fire severity accounting for a total of approximately 838 acres planted in 2008. During the summer of 2008, the Frazier Cabin Reforestation Project included 141 acres of mechanical site preparation which accounts for 0.16 percent of the analysis area and consequently results in a negligible contribution to cumulative effects. Approximately 10,500 acres of high severity, unsalvaged areas were planted in Spring 2009 across the Mt. Hough and Beckwourth Ranger District portions of the Moonlight and Antelope Complex fires utilizing a combination of low density planting arrangements. These additional acres of reforestation occurred in unsalvaged areas of the fire including old plantations and natural stands. Manual release treatments would occur within one to two years following planting. The net cumulative effect would be the enhanced establishment of conifer seedlings across the analysis area in order to re-establish forested conditions.

Private lands account for over 19,000 acres or approximately 22 percent of the analysis area. Since fall 2007 through the present, fire salvage harvest has been occurring on these lands. Approximately 4,073 acres were planned for salvage harvest in 2007 and fire salvage timber harvest plans filed to date in 2009 account for an additional 7,381 acres approximately. Based on current activity, private fire salvage projects occur mostly on productive, well-stocked stands that burned with moderate to high burn severity resulting in a notable reduction in densities of fire-killed and fire-injured trees on private lands. It is reasonably assumed based on state forest practice regulations and private timber practices that these areas would be re-planted and managed for maximizing tree growth.

There would be no habitat disruption or modification to rock outcrops, caves and mining adits. No man-made structures that could provide habitat for bats are planned for removal or modification, other than roads and culverts, both of which do not provide habitat. The project does not indicate that it would create a high risk related to pallid bat.

Based on the changes to habitat expected from the dead tree removal and subsequent reforestation, the Moonlight Wheeler Recovery and Restoration Project may affect, not likely to lead to federal listing or loss of viability, of the pallid bat.

Direct/Indirect and Cumulative Effects of No Action (Alternative B):
The Moonlight and Antelope Complex fires created open habitats and large snags which are used by pallid bat. Insects invading dead trees in the fire area would provide prey for this species in the area. As the montane chaparral matures and forms dense brush fields, foraging habitat quality would decline for pallid bats since they capture prey on the ground. The large snags would provide roosting habitat for pallids; the small amount of black oak (live and dead) would be retained. Snag densities (> 15" dbh) with the no action alternative would be higher across the landscape than with the action alternatives (16.8 snags/acre with no actions versus 11.7 to 13.3 snags/acre (Alt A and Alt C, respectively). This alternative would not affect pallid bat.

Western Red Bat

This species is usually found west of the Sierra Nevada/Cascade crest, most often below 3000-foot elevation, with migrants found outside their normal range. In 2002, six detections of red bat occurred between 4000 to 6000 feet along creeks, at seeps and in forest settings with mixed hardwood and conifer trees on the Plumas NF (Roberts, per. com).

There are no records of this species within or adjacent to the analysis area. Survey efforts and detections of western red bats have occurred at various locations across the Forest since 1992. A portion of Indian Creek within the analysis area was surveyed for bats but no western red bats were detected during this effort (Lengas & Bumpus 1992, 1993).

High severity wildfire could result in long term harmful effects to western red bat habitat due to reduction in existing large tree component within riparian habitats.
Roosting habitat includes forests and woodlands including mixed conifer forests. It roosts primarily in trees, less often in shrubs. Roosts are often in edge habitats adjacent to streams, fields, or urban areas. They are dependent on riparian and riparian edge and mosaic habitats. They appear to be highly associated with intact riparian habitat, particularly willows, cottonwoods, and sycamores (SNFPA, 2001). It tends to roost out on the edge of the foliage, and mostly in the largest cottonwoods (Pierson 1998 in SNFPA 2001).

Moon-Wheeler Project Effects to the Western Red Bat

All Action Alternatives – Direct/Indirect Effects.

Effects are similar as described for Pallid Bat except that impacts for this analysis are tied directly to impacts on cottonwood trees. Mature cottonwood trees suitable for red bat roosts are located along many stretches of perennial streams within the analysis area. Many of these large cottonwoods died as a result of fire. No cottonwood or other hardwood trees would be removed with this salvage project. The previously analyzed roadside hazard projects (USDA 2007a, USDA 2008a) discussed that cottonwood removal would be very limited (may even be non-existent), but it was possible that some may be deemed hazardous and removed, thus there could be a minimal direct loss of habitat. It is unknown as to what extent fire-killed trees, especially preferred riparian trees such as cottonwoods, are used by red bats, but if bats are using cottonwoods that are felled, direct mortality could occur.

All Action Alternatives – Cumulative Effects.

(Please see discussion on pg. 23 - General cumulative effects common to all action alternatives)

Cumulatively (after all other hazard tree removal and fire salvage projects are included) all action alternatives would exclude salvage and roadside hazard logging entirely from the majority of public lands: 73 % would be left untreated under alternative A, 82% under Alternative C, 86% under Alternative D, and 88% under Alternative E. Consequently, large areas of unsalvaged and untreated areas would exist under all action alternatives, maintaining forest stand structure that would provide for biological legacy values as described by Lindenmayer and Noss (2006). In addition, snag retention areas within salvage harvest units and exclusion of salvage harvest from low to moderate burn severity patches would provide for biological legacies within and outside the proposed treatment perimeters such as fire-killed and fire-damaged trees and large live and dead trees that have high habitat value (Lindenmayer and Noss 2006). Equipment restriction zones (in units where ground-based logging is proposed) and snag retention guidelines within RHCAs are designed to provide for protection of aquatic ecosystems and retain and recruit structure such as large down woody debris within riparian areas (Lindenmayer and Noss 2006, Reeves et al 2006).

Reforestation of national forest lands where no salvage harvest is proposed began within the analysis area in spring 2008. A combination of wide spaced cluster planting in the Antelope Lake and Babcock Peak areas and square-spaced planting in the Camp 14 area occurred within areas of high fire severity accounting for a total of approximately 1,200 acres planted in 2008. Up to 7,000 acres of reforestation in unsalvaged areas are currently being planned for spring 2009 and 2010 across the Mt. Hough and Beckwourth Ranger Districts; these additional acres of reforestation would also occur in unsalvaged areas of the fire including old plantations and natural stands. The net cumulative effect would be the enhanced establishment of conifer seedlings across the analysis area in order to re-establish forested conditions.

Over 11,400 of private land has been salvage harvested to date within the analysis area. It is reasonably assumed based on state forest practice regulations and private timber practices that these areas would be re-planted and managed for maximizing tree growth, thus resulting in a cumulative increase in early seral coniferous stages across the analysis area.

This species is relatively rare on the Plumas but its presence in isolated areas, as well as the presence of cottonwood in the project area, warrants a may affect, not likely to lead to federal listing or loss of viability of the western red bat.

Direct/Indirect and Cumulative Effects of No Action (Alternative B):
There would be no reduction in dead trees across the landscape or within RHCA's. The large cottonwoods along riparian corridors that survived the fires would provide for red bat roosts. The multiple edges produced by the mosaic burn pattern, as well as the fire perimeter, create habitat preferred by red bats. This alternative would not affect western red bat.

References.

Adams, R., and D. Simmons. 1999. Ecological effects of fire fighting foams and retardants. In Conference Proceedings: Australian Bushfire Conference, Albury, July 1999. School of Environmental & Information Sciences, Charles Stuart University, New South Wales, Australia. 8 pp.
Source: http://life.csu.edu.au/bushfire99/papers/adams/index.htm

Aubry, Keith B., K.S.McKelvey, J.P. Copeland, 2007. Distribution and Broadscale Habitat Relations of the Wolverine in the Contiguous United States, Journal of Wildlife Management Volume 71, Issue 7 (September 2007) pp. 2147-2158.

Bat Conservation International (BCI). 2004. "Meet Some Bats: The Pallid Bat". Meet Our Bats. Website: http://www.batconservation.org/content/meetourbats/pallidbatinfo.html

Beschta, R.L., J.J. Rhodes, J.B. Kauffman, R.E. Gresswell, G.W. Minshall, J.R. Karr, D.A. Perry, F.R. Hauer, and C.A. Frissell. 2004. Postfire Management on Forested Public Lands of the Western United States. Conservation Biology, Vol. 18, No. 4, August 2004, pages 957-967.

Bond, M.L., R.J. Gutiérrez, A.B. Franklin, W.S. LaHaye, C.A. May, and M.E. Seamans. 2002. Short-term effects of wildfires on spotted owl survival, site fidelity, mate fidelity, and reproductive success. *Wildlife Society Bulletin* 30:1022–1028.

Bond, M.L. 2007. An Assessment of the Impacts of the Sttorrie Fire on Sensitive and Management indicator Species and Habitats, Expert Report, Case No. 2:06-CV-01740-FCD-KJM, June 2007.

Buhl, K.J. and S.J. Hamilton. 2000. Acute toxicity of fire control chemicals, nitrogenous chemicals, and surfactants to rainbow trout. Transactions of the American Fisheries Society. 129:408-418. Jamestown, ND.

Bull, Evelyn L.; Parks, Catherine G.; Torgersen, Torolf R. 1997. Trees and logs important to wildlife in the interior Columbia River Basin. Gen. Tech. Report PNW-GTR-391. Portland, OR: US DA, Forest Service, Pacific Northwest Research Station. 55p.

Butts, T.W. 1992. Wolverine (Gulo gulo) biology and management: A literature review and annotated bibliography. Unpublished paper for the U.S. Forest Service. Northern Region.

California Department of Fish and Game. 2006. California Wildlife Habitat Relationships System: Life History Account Database http://www.dfg.ca.gov/whdab/html/cawildlife.html).

California Spotted Owl Module: 2007 Annual Report, 10 January 2008. John Keane principal investigator.

Campbell, R.E., M.B. Baker Jr., P.F. Ffolliott, F.R. Larson, C.C.Avery. 1977. Wildfire effects on a ponderosa pine ecosystem; an Arizona case study. Res. Paper RM-191. USDA Forest Service, Rocky Mtn. Forest & Range Experiment Station, Ft. Collins, CO. 12pp.

Clark, D. A. 2007. Demography and habitat selection of northern spotted owls in post-fire landscapes of southwestern Oregon. Master's Thesis, Oregon State University, Corvallis, Oregon.

Cluck D.R. and S.L. Smith. 2007. Fall Rates of Snags: a summary of the literature for California conifer species. USDA Forest Service, Region 5, Forest Health Protection (NE-SPR-07-01).

ECORP Consulting, Inc. December 6, 2000. Antelope Border, Stony Ridge and Cold DFPZ Fish and Herptofauna Surveys.

ECORP Consulting, Inc. September 7, 2001. Kingsbury/Rush, Waters, Antelope Border, Stony Ridge and Cold DFPZ Amphibian Surveys.

Federal Register June 21, 2005

Freel, M. 1991. A literature review for management of fisher and marten in California. Unpublished document, USDA, Forest Service, Pacific Southwest Region. 22pp.

Garcia & Associates, 2003. California Spotted Owl Surveys for the TU-9 Project Area, Mt. Hough Ranger District, Plumas National Forest. Contract #53-9SCP-03-1K-51, October 2003.

Greenberg, C.H., L.D. Harris, and D.G. Neary. 1995. A comparison of bird communities in burned and salvage-logged, clearcut, and forested Florida sand pine scrub. Wilson Bulletin 107(1):40-54.

Grifantini, M.C. 1991. Early-seral changes following wildfire, salvage-logging and reforestation, Klamath Mountains, CA. Masters thesis, Humboldt State University, Arcata, CA 47 pp.

Gruell, G.E. 1980. Fire's influence on wildlife habitat on the Bridger-Teton National Forest, Wyoming. Volume II-Changes and causes, management implications. Res. Paper. INT-252. USDA Forest Service Intermountain Forest Range Experiment Station, Ogden, UT. 35pp.

Hall, P. A. 1984. Characterization of nesting habitat of goshawks (Accipiter gentiles) in Northwestern California. M.S. Thesis, California State University, Humboldt. 70 pp.

Haim, A., and I. Izhaki. 1994. Changes in rodent community during recovery from fire; relevance to conservation. Biodiversity and Cons. 3:573-585.

Holmes-TerraMar 2006. Final Report for the FY 2005-2006 Diamond Project California Spotted Owl (*Strix occidentalis occidentalis*) Survey, Mt. Hough Ranger District, Plumas National Forest, Contract #53-9SCP-05-1K-49. October 2006.

Hood, S.M., Smith, S.L., and D.R. Cluck. 2007. Delayed Conifer Tree Mortality Following Fire in California. In: Powers, Robert F., tech. editor. Restoring fire-adapted ecosystems: proceedings of the 2005 national silviculture workshop. Gen. Tech. Rep. PSW-GTR-203, Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture: p. 261-283.

Hopkins, Tina. 2008. Plumas National Forest Fisheries Biologist, personal communication.

Hornocker, M.G. and H.S. Hash. 1981. Ecology of the wolverine in northwestern Montana. Can. J. Zool. 59:1286-1301.

Huff, M.H., J.K. Agee, and D.A. Manuwal. 1985. Post-fire succession of avifauna in the Olympic Mountains, Washington. In Fire's effects on wildlife habitat-symposium proceedings, Missoula, MT, March 21, 1984. Gen Tech. Report INT-186. USDA Forest Service, Ogden UT 8-15.

Hunter, Malcolm Jr. 1990. Wildlife, Forests, And Forestry, Principles of Managing, Forests for Biological Diversity, Prentice Hall Career & Technology, New Jersey.

Hutto R.L. 2006. Toward Meaningful Snag-Management Guidelines for Postfire Salvage Logging in North American Conifer Forests. Conservation Biology, Vol 20, No. 4, p. 984-993.

Hutto, R.L. 2008. The ecological importance of severe wildfires: some like it hot. Ecological Applications 18: 1827-1834.

Jenness, J. J., P. Beier, and J. L. Ganey. 2004. Associations between forest fire and Mexican spotted owls. *Forest Science* 50:765–772.

Jennings, M.R., M. P. Hayes. 1994. Amphibian and Reptile Species of Special concern in California. Final report submitted to the CDFG.

Kattlemann, R. 1996. Hydrology and water resources. In SNEP, No. 37. pp 855-920.

Keane, J. J. 1997. Ecology of the northern goshawk in the Sierra Nevada, California. Unpublished Ph.D. Dissertation.

Keane, J.J. 2008. Research Ecologist, Sierra Nevada Research Center, Pacific Southwest Research Station, USDA Forest Service, personal communication.

KWR, 2006. Diamond Northern Goshawk (*Accipiter gentilis*) Survey, Plumas National Forest, Mount Hough Ranger District 2005-2006, Final Report. MGW Biological/Klamath Wildlife Resources Joint Venture. October 11, 2006.

Lengas, B.J. and D. Bumpas. 1992. An Initial sampling of the bat fauna of the Plumas National Forest, 1 February 1992.

Lengas, B.J. and D. Bumpas. 1993. An additional sampling of the bat fauna of the Plumas National Forest, 1 January 1993.

Lindenmayer, D.B. and R.F. Noss. 2006. Salvage Logging, Ecosystem Processes, and Biodiversity Conservation. Conservation Biology Volume 20, No. 4, p. 949-958.

Lyon, L.J. 1977. Attrition of lodgepole pine snags on the Sleeping Child Burn, Montana. USDA Forest Service, Intermountain Forest & Range Experiment Station Resource note INT-219. Ogden, UT 4 pp.

Lyon, L.J., and J.M. Marzluff. 1985. Fire's effects on a small bird population In Fire's effects on wildlife habitat—symposium proceedings, Missoula, Montana, March 21, 1984. J.E. Lotan and J.K. Brown, Symposium Co-chairmen. Gen. Tech. Report. INT-186. USDA Forest Service, Intermountain. Forest. Range Expt. Stn. Pp. 16-22.

Mayer, K.E.; Laudenslayer, W.F., Jr., eds. 1988. A Guide to Wildlife Habitats of California. Sacramento, CA: California Department of Forestry and Fire Protection. 166 pp.

MGW Biological and Klamath Wildlife Resources. 2006. Habitat use, home range, and movements of Mountain Yellow-legged Frogs (*Rana muscosa*) in Bean Creek on the Plumas National Forest, Final Report.

Noste, N.V. 1985. Influence of fire severity on response of evergreen Ceanothus. In Fire's effects on wildlife habitat—symposium proceedings, Missoula, Montana, March 21, 1984. J.E. Lotan and J.K. Brown, Symposium Co-chairmen. Gen. Tech. Report. INT-186. USDA Forest Service, Intermountain Forest Range Expt. Stn. Pp. 91-96.

PNF, 1993. Biological Evaluation for manageing Eastside Pine Habitat for the California Spotted Owl, Plumas Natinal Forest Beckwourth Ranger District and Milford Ranger District, 10/27/93.

Raphael, M.G., and M.L. Morrison. 1987. Decay and dynamics of snags in the Sierra Nevada. For. Science. 33(1):774-783.

Reeves GH, Bisson PA, Rieman BE, Benda LE. 2006. Postfire logging in riparian areas. Conserv Biol 20:994–1004.

Richter, D. J. and R. Calls. 1996. Territory occupancy, nest site use, and reproductive success of goshawks on private timberlands: Progress report. 1996. California Department of Fish and Game, Sacramento, CA.

Rotta, Gary W. 2000. Eastside Zone Suitable Spotted Owl Habitat. (An internal summary and collection of supporting documents/letters), 6-23-2000.

Rotta, Gary W. 2007: Post Antelope and Moonlight Wildfire Spotted Owl PACs - Preliminary Analysis. Internal Forest paper developed for Forest Supervisor, 11/15/2007.

Ruggiero, L. F., K.B. Aubry, S.W. Buskirk, L.J. Lyon, and W.J. Zielinski. 1994. The scientific basis for conserving forest carnivores: American marten, fisher, lynx, and wolverine. General Technical Report GTR RM-254. Fort Collins, Colorado: USDA Forest Service, Rocky Mountain Forest and Range Experiment Station. 184pp.

Schempf, P.F. and M. White. 1977. Status of six furbearer populations in the mountains of northern California. USDA Forest Service. 51pp.

Sierra Nevada Research Center. 2007. Plumas Lassen Study 2006 Annual Report. USDA Forest Service, Pacific Southwest Research Station, Sierra Nevada Research Center, Davis, California. 182pp.

Sloat, T. 2002. Results of Spotted Owl survey for the Stream Fire.

Stebbins, R.C. 1985. A field guide to western reptiles and amphibians. Second edition, revised. Houghton Mifflin Company, Boston, USA.

USDA Forest Service. 1993. California Spotted Owl Sierran Province Interim Guidelines Environmental Assessment, (CASPO IG EA) January 1993.

USDA Forest Service. 1999. Herger-Feinstein Quincy Library Group Forest Recovery Act Final Environmental Impact Statement, August 1999.

USDA Forest Service. 2000a. Biological Assessment/Evaluation of aerially delivered fire retardant guidelines. Prepared by Kent N. Russell. Washington Office. Washington, D.C. 9 pp.

USDA Forest Service, 2000c. Letter from P. Janik to Regional Foresters and Area Directors. Subject: guidelines for aerial application of retardants and foams in aquatic environments. 4/20/00. Washington Office. Washington, D.C. Loose-leaf pub. (n.p.).

USDA Forest Service, 2000d. Wildland fire suppression chemicals toxicity and environmental issues and concerns. Washington Office. Washington, D.C. 2 pp. Source: http://www.fs.fed.us/rm/fire/The_Environment.html

USDA Forest Service. 2001. Sierra Nevada Forest Plan Amendment Final Environmental Impact Statement Record of Decision (ROD), January 2001.

USDA Forest Service. 2004. Sierra Nevada Forest Plan Amendment (SNFPA) Final Supplemental Environmental Impact Statement (SFEIS), January, 2004.

USDA Forest Service. 2005. Sierra Nevada forest plan accomplishment monitoring report for 2004. USDA Forest Service, Pacific Southwest Region R5-MR-026. 8pp.

USDA Forest Service. 2006. Sierra Nevada forest plan accomplishment monitoring report for 2005. USDA Forest Service, Pacific Southwest Region R5-MR-000. 12pp.

USDA Forest Service. 2007a. Moonlight Fire BAER Specialist Report: Fisheries and Wildlife. 12pp.

USDA Forest Service, 2007b. Antelope Complex Roadside Hazard Tree Removal Project (Sage, Antelope, Last Chance), Mt. Hough Ranger District, Biological Assessment/Biological Evaluation, August 28, 2007.

USDA Forest Service 2007c. Sierra Nevada Forests Management Indicator Species Amendment FEIS, R5-MB-159, December 2007.

USDA Forest Service, 2008a. Moonlight Roadside Safety and Hazard Tree Removal Project, Mt. Hough Ranger District, Biological Assessment/Biological Evaluation, April, 2008.

USDA Forest Service 2008b. Life History and Analysis of Management Indicator Species of the 10 Sierra Nevada National Forests, Eldorado, Inyo, Lassen, Modoc, Plumas, Sequoia, Sierra, Stanilaus, and Tahoe National Forests and the Lake Tahoe Basin Management Unit, January 2008 (Draft).

USDA Forest Service 2009a. Sierra Nevada Forest Plan, Accomplishment Monitoring Report for 2006. Accessed via http://www.fs.fed.us/r5/snfpa/monitoringreport2006/.

USDA Forest Service 2009b. Moonlight and Wheeler Fire Recovery and Restoration Project; Forest Vegetation, Fuels, Fire and Air Quality Report. Mt. Hough Ranger District, Plumas National Forest.

USDA Forest Service 2009c. Moonlight and Wheeler Fire Recovery and Restoration Project; Watershed Report. Mt. Hough Ranger District, Plumas National Forest.

U.S. Fish and Wildlife Service (USFWS). 2001. Final Designation of Critical Habitat for the California Red-Legged Frog. Final Rule. Federal Register 66 (49): 14626-14674.

U.S. Fish & Wildlfie Service (USFWS). 2002. Recovery Plan for the California Red-Legged Frog *(Rana aurora draytonii*), Region 1 USFWS, Portland, Oregon. May 28, 2002.

U.S. Fish and Wildlife Service (USFWS). 2004. Endangered and Threatened Wildlife and Plants; Proposed Designation of Critical Habitat for the California Red-Legged Frog (Rana aurora draytonii). Proposed Rule. Federal Register 69(71): 19620-19642.

Verner, J., K.S. McKelvey, B.R. Noon, R.J. Gutierrez, G.I. Gould, and T.W. Beck, 1992, technical coordinators. The California Spotted Owl: A Technical Assessment of its Current Status. GTR PSW-133. Albany, CA: PSW Research Station, USFS, USDA; 285p.

Wilson, G. 1994. Wildlife Biologist, Tahoe National Forest, Sierraville Ranger District, personal communication.

Zeiner, D.C., W.F. Laudenslayer, Jr., and K.E. Mayer, Compiling Editers. 1988. California's Wildlife, Volume I: Amphibian and Reptiles. State of California, The Resources Agency, Department of Fish and Game, Sacramento, CA. 272 pp.

Zielinski, William J., R.L. Truex, F.V. Schlexer, L.A. Campbell, C.Carroll. Historical and contemporary distributions of carnivores in forests of the Sierra Nevada, California, USA. Journal of Biogeography 2005, 32, 1385-1407.

Zeiner, D.C., W.F. Laudenslayer, Jr., K.E. Mayer, and M.White. . 1990. California's Wildlife, Volume III, Mammals. California Department of Fish and Game. Sacramento, California. 407pp.

Attachment 1: Estimated existing snag densities in analysis area (FS acres).

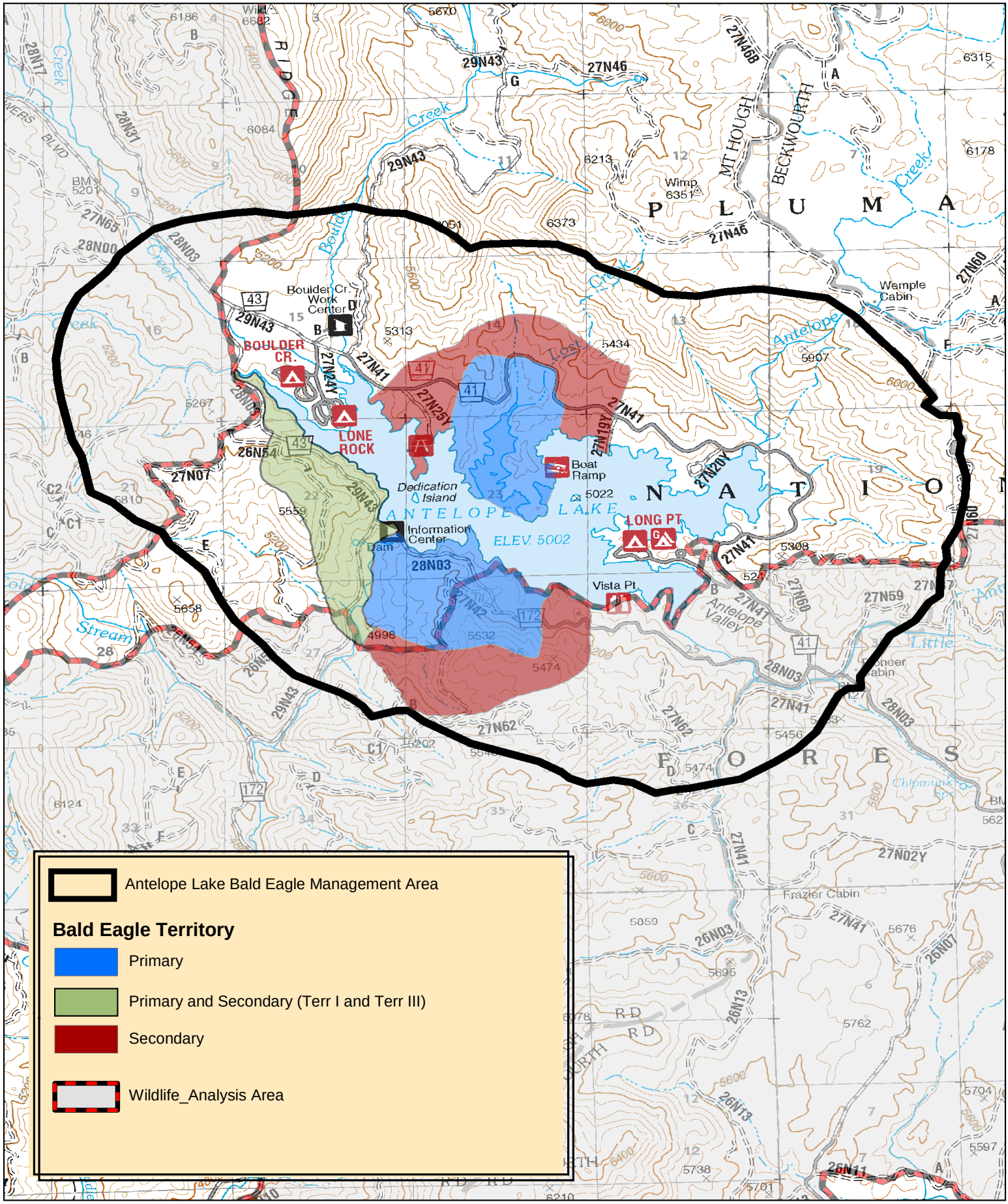
Snags - Moonlight-Wheeler Fires (Forest Service acres only)

Existing Condition (averaged across the analysis area within all Forest Service CWHR 4M, 4D, 5M, and 5D stands (totaling 45,895 acres).

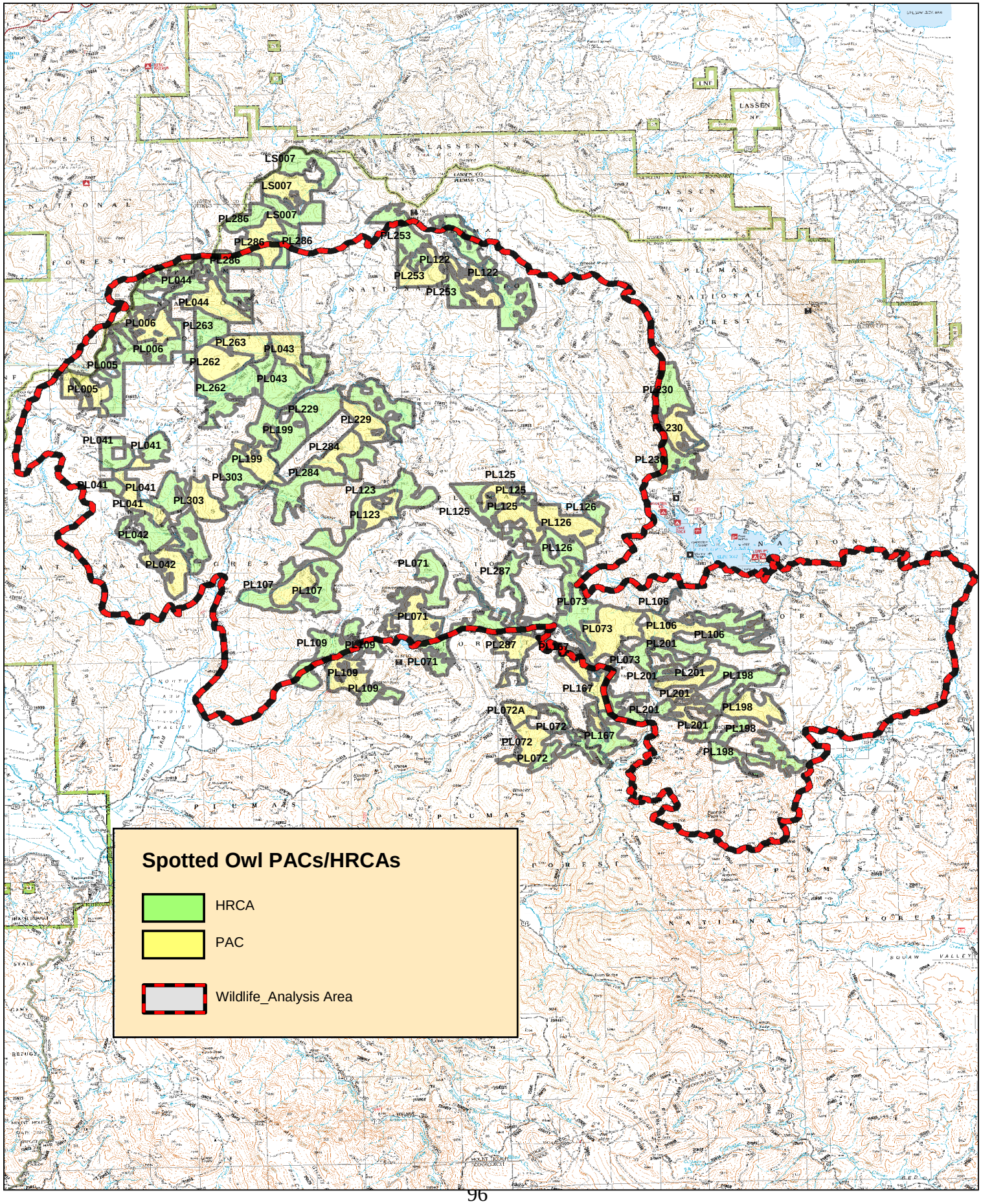
10"-15"/ >15"			Dead trees per acre by diameter class				# of trees for all acres by severity			
Site Class	Acres		low severity		high severity		low severity		high severity	
	low severity	high severity	10" to 15"	>15"	10" to 15"	>15"	10" to 15"	>15"	10" to 15"	>15"
III & IV	2002	4474	4	5	39	42	8008	10010	174486	187908
V	10956	28463	3	3	45	19	32868	32868	1280835	540797

>15" snags/acre	**16.8**
10" to 15" snags/acre	**32.6**

Attachment 2: Antelope Lake Bald Eagle Management Area and territories.

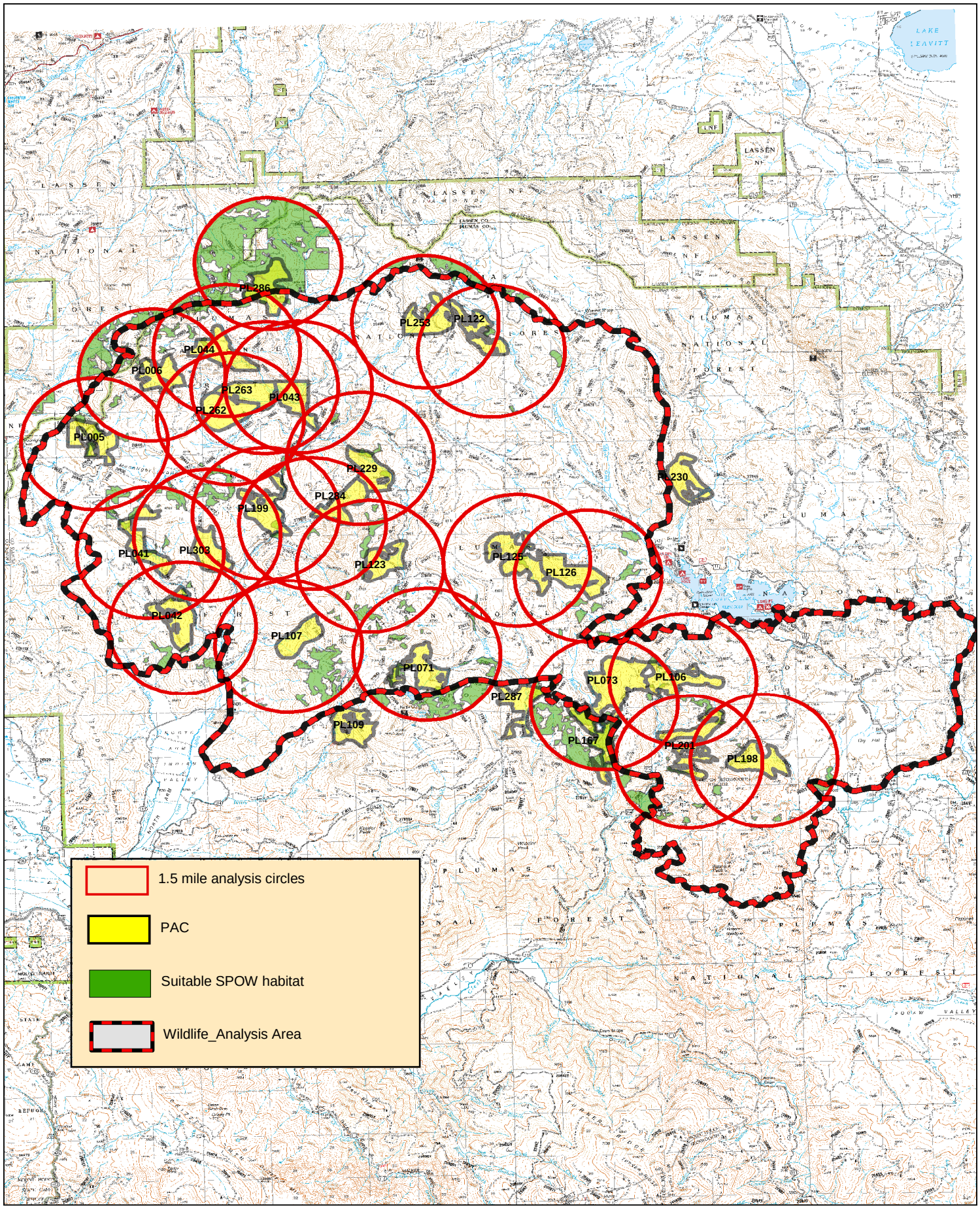


Attachment 3: Spotted Owl PACS within analysis area.

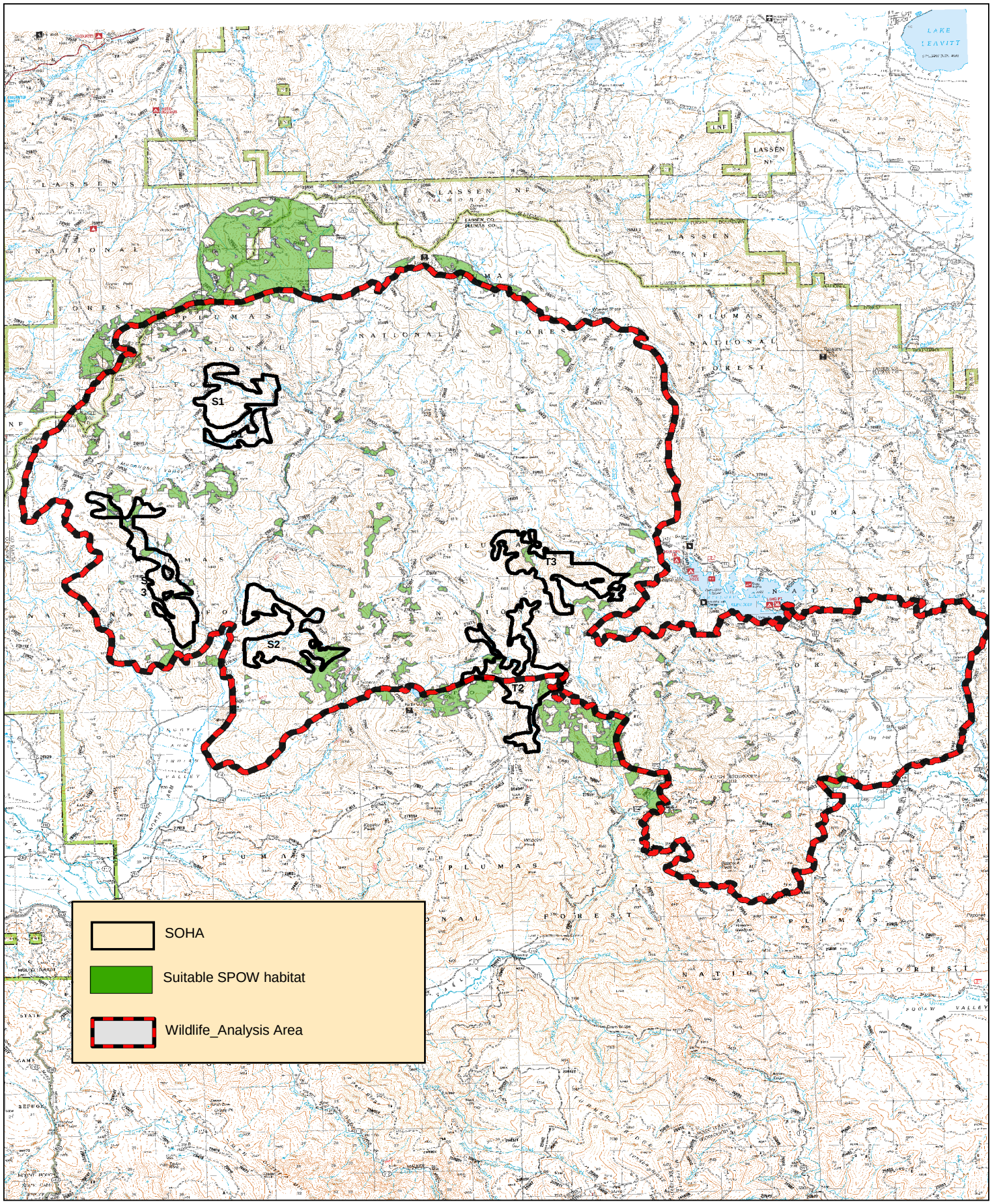


Attachment 4: Spotted Owl PAC 1.5 mile circles

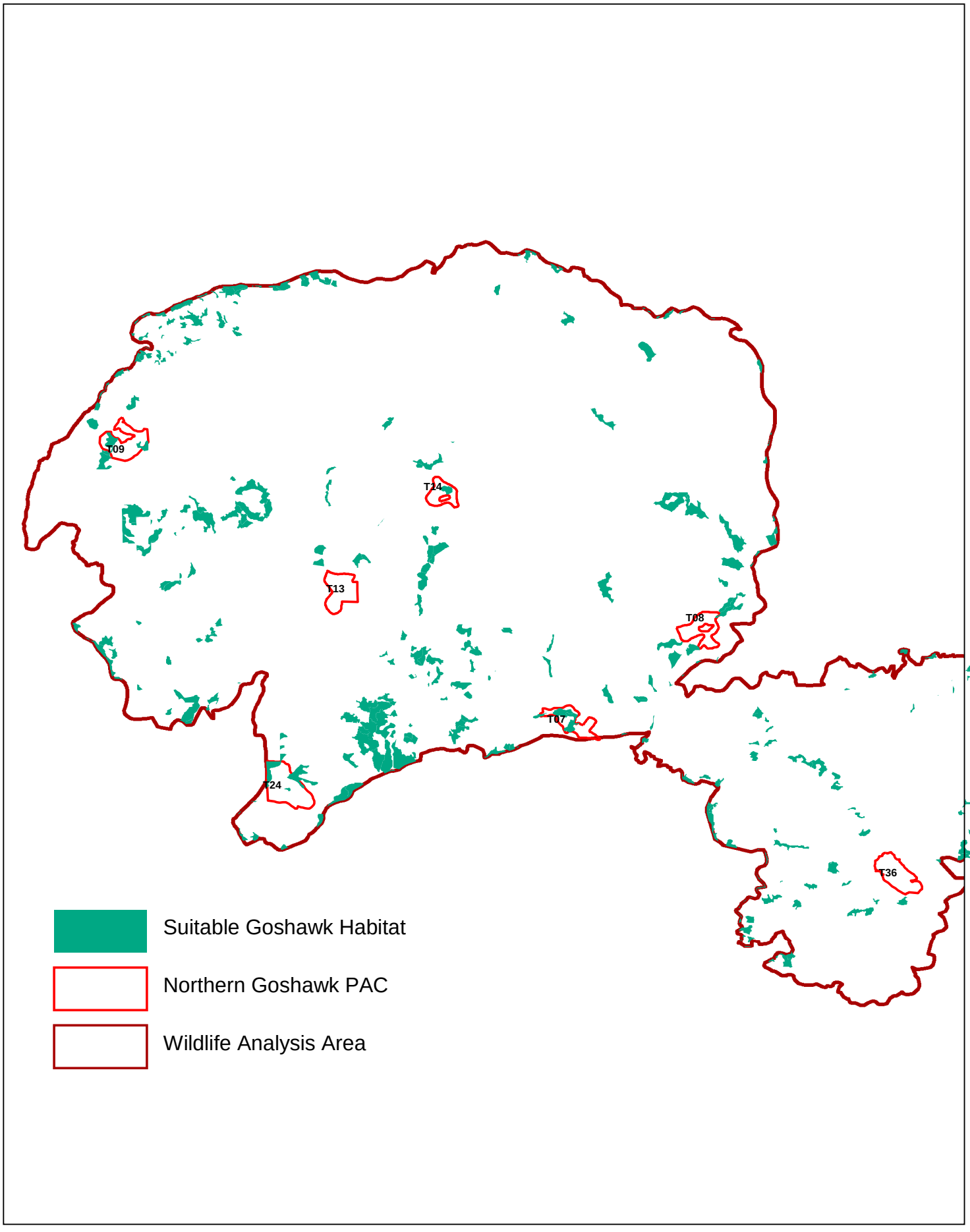
for evaluation analysis and remaining suitable habitat.



Attachment 5: Spotted Owl Habitat Areas (SOHAs)
in analysis area and remaining suitable habitat.



Attachment 6:Northern Goshawk PACS and suitable habitat in analysis area.



Attachment 7: Draft carnivore network and post-fire suitable habitat